

Research Article

The COVID-19 pandemic and student engagement in online learning: The moderating effect of technology self-efficacy

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This study examines the moderating effect of technology self-efficacy on the relationship between online learning and student engagement in a higher education setting. A survey was used to gather data from participants ($n = 425$) who were sampled from a population of registered students in a Technical University in Ghana. The data gathered were examined using hierarchical regression analysis. Results revealed that, technology self-efficacy strengthens 1) the positive relationship between online learning environment and student engagement; and 2) the positive relationship between instructional resources and student engagement. Secondly, the results revealed that the type of device used by students in the online learning environment has a positive and significant effect on student engagement. Conversely, findings of the current study show that while gender has a negative but significant effect on student engagement, age and academic discipline have insignificant effect on student engagement in the online learning setting. These findings among others lead the authors to propose ways that future studies could examine how technology self-efficacy, learning devices, instructional resources, institutional support systems and the online learning environment could be developed to enhance effective student engagement.

Keywords: Student engagement; Technology self-efficacy; Online learning; COVID-19; Learning resources

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1. Introduction

The SARS-CoV-2 (COVID-19) pandemic has created momentous challenges for educational intuitions with about 38,560,502 learners representing 2.4 percent of total learners worldwide in 10 countries still out of school due to countrywide school closures as of November 11, 2021. Not only did the COVID-19 pandemic alter the traditional and blended mode of learning to fully remote delivery (Prokes & Housel, 2021), it also stretched the resources of countries and educational institutions. Without doubt, the COVID-19 pandemic gave rise to the use of digital tools and technology-mediated learning processes in educational institutions (Camas et al., 2021; Dhawan, 2020). In Ghana, evidence show that before the COVID-19 pandemic, very few higher education institutions (HEIs) had appraised and adopted innovative teaching and learning practices as well

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GYWbXž Wb]gfi W]j]ga ' !' h Uhi]g' U h Ycfm]cZ 'YUfb]b[' Y d'U]bg' h Y UM]j Y UbX']b]h]df]YU]j Y dfcWgg'cZ\ck]b]X]j]Xi Ug'a U Ya Yb]b['cZUM]j]h]Yg']b' h Y f' Ybj jfcba Yb]h]c']j Yf' / < Yff]b[]cbž &SŠ' E' 'Ch'Yf' Z'fa i 'U]cb' g' [] Yg]h'Uhi Wb]gfi W]j]ga ']g' VUg'X' cb' h Y Ugg' a d]h]cb' h Uhi gi XYblg' Wb]gfi W]h' Yf' _bck 'YX] Y UbX' Y dYf]YbW' 'YUfb]b[' Ug' UM]j Y dfcWgg' fU' h Yf' UbX' bch' U dUgg]j Y dfcWgg' fC' 7 cbbcfž &SŠ' E' H' YfZcf'ž h Y UM]j Y dU]h]W]U]cb' cZ 'YUfb]Yg']b' Ub' cb'jBY 'YUfb]b[' Ybj jfcba Yb]h]g' gi XYbh Wb]h]WY]W] gž]h]b]W'f'cd'fU]g' Y Ya Yblg' g' W' Ug' hWbc'c[m]Udd']W]h]cbž dYXU' c[nž]bg]h hcbU' dfc]j]g]cbg']b]W' X]b[' 'YUfb]b[' fYgci fWg' UbX']b]h]YUM]cb' " H]g' Z' f]h' Yf' X'Ya cbg]fU]g' h Y Wb]h]bi ci g' g']Zi cZ hUW]b[' dYXU' c[]Yg' Z'ca ' U hUWYf]Wb]f]YX' lc' 'YUfb]f] Wb]f]YX' Udd'f'UW' f]C' Y]U]lc' / ' A U'W'cb'U'Xž &SŠ' E' 'F'Yg' 'h]b]h]nž h Y Uja 'cZ'cb'jBY 'YUfb]b['gn]Ya g' g'ci 'X'VY'lc' Yb\UbW' gi XYblg' 'YUfb]b[' Y dYf]YbW']b' Ub' YXi WjcbU' g]h]b[' f]f' \]]g]a Ubbž &SŠ' / ži a Už &SŠ' E' " H'c' Y Ua]bY \ck ' Wb]gfi W]j]ga ' g]f]j Yg'lc' Yb\UbW' h Y 'YUfb]b[' Y dYf]YbWg' cZ gi XYblg']b' Ub' cb'jBY 'YUfb]b[' Ybj jfcba Yblž h]g' gi Xmi Z'Wg'Y'cb' gi XYbh Yb[U Ya Yb]h]g' Wb]Wdh

hUhi]bhfYgWg k]h' hY' YUfb]b[' Ybj]fcba Yblz hWbc`c[m UbX']bg]h hcbU' g ddcfh gnghá g" Gi XYbhYb[U Ya Ybh]gUWa d'Y' UbX'a i' hZUMYXWbWdhk]h' a YUWbgbfi Wdh UhY d'Ubg\ck' gh XYblg' UW]Yj Y h Yf' YUfb]b[' [cUg' cf' ci hWa Yg' h fci [\ ']bhfUM]cb' k]h' h Yf' YUfb]b[' Ybj]fcba Ybhif U i ž&S% E"

: ci f' YYa Yblg' i bXYfd]b' Yb[U Ya Ybh' %LhY V\U jci fU' dYfgdYm]j Y h Uh Y d'Ubg' gi XYblg' V\U jci f']b' fYU]cb' h']bg]h hcbU' dc\]Yg' UbX' dfUM]WUg' k Y' U' g' YZVMj Y hUW]b[' dfUM]W' &LhY dgnWc`c[]W' dYfgdYm]j Yz h Uh Y d'Ubg' Yb[U Ya Ybh' U' g' Ub']bX]j]Xi U']bhfU' UbX' dgnWc! g' V]U' d'fcWgg' ' Lh Ygc Vc! W' h fU' dYfgdYm]j Yz k \]W' XY]bYg' h Yfc' YcZh Ygc Vc! dc\]hW' Wbhl h UbX' (Lh Y' c\]g]WdYfgdYm]j Yz h Uh]bhf[fUhg' h Y X]ZfYbh ZUMg' cZ Yb[U Ya Ybh' fU' i ž&S% ž d'+), E' 5' g' a a fmicZ']hU' fY' cb' gi XYbhYb[U Ya Yblz hWbc`c[migYZYZVMh UbX' h Y' cb']bY' YUfb]b[' Ybj]fcba YbhUFYdfYg]b]X']b' HUY%"

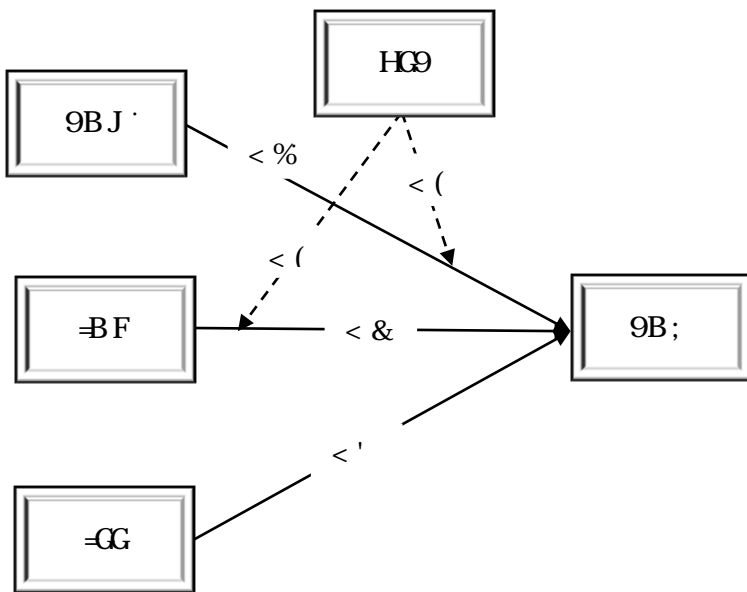
5 W'fgcfm'cc_ Uih YZ]bX]b[g'cZh YX]ZfYbhgi X]Yg]b' HUY%g\ck' h Uh h Yf]gUfYU]cbg\]d' V]k Yb' gi XYbhYb[U Ya Yblz hWbc`c[migYZYZVMh UbX' cb']bY' YUfb]b[" : cf']bg]UbW' 7Ugg]Xm UbX' 9UWi g' f&S&E' g\ck' h Uh h Yf]YfY g]]b]Z]Wbh d'cg]h] Y WffYU]cbg' V]k Yb' Wa di hf' g'YZ ZYZVMh UbX' Wa di hf' Y' dYf]YbWUbX'Za]]Uf]hmik]h' Wa di hf' g'Zk UYdUWU Yg' G]a]'U' nzh Y gi XmVmDY' U' g' f&S% E' fY' YUYX' h Uh Wa di hf' g'YZYZVMh za YUW] b]h] Yg'ZfY[i' U]cb' UbX' g'YZ Yg]Ya ']b' cb']bY' W' f'g'g' k Yf' d'cg]h] Ym WffYU]X' k]h' gi XYblg' W[b]h] Y UbX' Ya chcbU' Yb[U Ya Ybh' ZUM'fg" Cb' h Yf' d'Ufz G]g] dUk cb[' Y' i U" f&S% E' g\ck' YX' h Uh dYfWdhcbg' cZ U W'gg'fcca !' YUfb]b[' Ybj]fcba Ybhk]h' U' h' bca nza YU]b[Z']bYgg' UbX']bj c' j Ya YbhUFYd'cg]h] Ym Ugg' V]U]X'k]h' g'fcb[' Wa di hf' g'YZYZVMh"

% "HAY7cbWdh U : fUa Yk cf_ UbX< nclh Ylg'

HAYWbWdh U' ZUa Yk cf_]g' Xf]j YX'Zca ' h Ygc V]U' W[b]h] Y h YcfmUbX' Wbgbfi W]j]ga " :]fgž :]] i fY%g\ck' g' h YfYU]cbg\]d' V]k Yb' cb']bY' YUfb]b[' Ybj]fcba Yblz]bg]fi W]cbU' fYgc fWg'UbX']bg]h hcbU' g' ddcfh gnghá g' Xi f]b[' h Y 7CJ =8!% ' dUbX' Ya]WGYWbX' nž Z[i fY%]' i g'fUhg' h Y a cXfU]b[' YZVM cZ hWbc`c[m g'YZYZVMh cb' : %Lh Y fYU]cbg\]d' V]k Yb' cb']bY' YUfb]b[' Ybj]fcba YbhU'X' gi XYbhYb[U Ya YbhU'X' &Lh YfYU]cbg\]d' V]k Yb']bg]fi W]cbU' fYgc fWg'UbX' gi XYbhYb[U Ya Ybh]b' h Yi b]j Yf]m]"

:]] i fY%

HAYgi XYbhYb[U Ya YbhZUa Yk cf_ '



Bch' 9B; !' Gi XYbh Yb[U Ya Ybh' HC9' i' hWbc`c[m g'YZYZVMh 9BJ' i' Cb']bY' YUfb]b[' Ybj]fcba Ybh UbX' =BF i']bg]fi W]cbU' fYgc fWg'CG']bg]h hcbU' g' ddcfh gnghá g'UbX']bhf] Ybh]cbg'"

HUVY%

@|HfUhi fYg a UfmiUVYZf: gi XbhnYb| U Ya YbiziHWbc| mgYZYZZVMMWUbxcb| bY'Xfb|b| Ybj |fcb a Ybhi

5i fhcf#MF'cZdi V"	Chi Xngth b	H\XfYfW' i bXfclbb b	A YhcXgfb ddfcUW:	: lbX b g
8i fbXY... UbX < U	< \ Yf'9Xi W qcb	=b f fUXX'fX Ycf Yg	Ei Ub H U j Y'UddfcUW	A UY' gi Xyblg' X'Ya cbg'fUAX' d'cg Hj Y U Hh X'Yg fck U'Xg' h Y b HbY'f' g'fcb Yf' W'a di hf' g'YZ YZZVMMW' ck Yf' W'a di hf' U Ym Ubx' cb Yf' i gY cZk Y=b HbY'f k U'Z'a UYg'...
7UggXm UbX' 9UWi g	< \ Yf'9Xi W qcb	CcMU' W b Hj Y'fX Ycfm	Ei Ub H U j Y'UddfcUW	H\YfY UY' g b ZVb h d'cg Hj Y W'fYU'fcbg VMk Yb' W'a di hf' g'YZYZZVMMW' Ubx' W'a di hf' Y' dYf YbW' UbX' Z'a U f mi k h' W'a di hf' g'Zk UY'dUWU' Yg'...
DY' Ug'fRS%L	< \ Yf'9Xi W qcb	A c Hj U'qcb UbX' gi Xyblg'f Yb U' Ya Ybhi	Ei Ub H U j Y'UddfcUW	7ca di hf' g'YZYZZVMMW' a YHUW b Hj Y' g'YZ fX' i U'qcb UbX' g'YZYg'Y'Ya b'cb Y'W'i fgYgk YfY d'cg Hj Y'mi W'fYU'AX' k h' gi Xyblg' W b Hj Y UbX' Ya c cbU' Yb U' Ya YbhiZVMMW'f'...
< ck U'X'Z' A U UbX' Mb	< \ GW'cc' Gi Xyblg'	HW'bc' c m i gY' UbX' Y' dYf YbW'g	Ei Ub H U j Y'UddfcUW	H\YfY UY' X Z'fYb h dUHf'f'bg' U' a cb g'W'cc' Yb U' Ya Ybhi UbX' W'a di hf' YZYZZVMMW' ZVMMW'g' Ug' k Y' Ug' VMk Yb' gi Xyblg' k h' d'cg Hj Y UbX' bX U j Y'Yb U' Ya Ybhi k h' X H U'f'W'bc' c Yg'...
FUG'X' UbX' 5g \ U'	< \ Yf'9Xi W qcb	7Ug' U' fX Ycfmi	Ei Ub H U j Y'UddfcUW	H\Y' i gY' cZ' HW'bc' c m \ Ug' U' X fYm' d'cg Hj Y fYU'fcbg' d' k h' gi Xyblg'f'Yb U' Ya YbhiUbX' g'YZ X fYmX' Y'Uf b
@ UbX'6U' Yf'fRS%L	< \ Yf'9Xi W qcb	9b U' Ya Ybhi	Ei Ub H U j Y'UddfcUW	H\Y' g'f'a Y' Yb U' Ya Ybhi j U'fU'VY' W'i X' VY cdd'cg Hj Y'mi Ug'f'W'U'X' k h' U'W Y' Ya Ybhi cZ' X Z'fYb h g' V' f'ei dg' Z'f' V'ch' V'X' U' j' c'fU' UbX' W b Hj Y'Yb U' Ya Ybhi'
Cf g' dUk' cb Yh U''	< \ Yf'9Xi W qcb	GYZYZZVMMW'i	Ei Ub H U j Y'UddfcUW	DY'W'd H'cbg' cZU'W'U'g'f'cca' ! Y'Uf b Ybj fcb a Ybhi k h' U' l'cbca n'z' a Y'Uf b Z' b'Y'g'z' UbX' b c' j Ya Ybhi k YfY' d'cg Hj Y'mi Ug'f'W'U'X' k h' g'fcb W'a di hf' g'YZYZZVMMW'i
H\YcU'X'Z'K bX'g'f' UbX' : cf H'f'fRS%L	< \ Yf'9Xi W qcb	CcMU' W'bg'f'f' W j g'a	Ei U H U j Y'UddfcUW	Gi Xyblg' \ U' Y'h Y'W'dU'W'm'le' Y'U'X' UbX' Yb U' Y' b U' W'a a b H'icZ' Y'Uf b UbX' l'c' H'U' Y' c'k b'Y'g' d' UbX' f'Y'g'c'cbg' V' m'k \ Y'f' g'W'Z' X b g'd'f'c X'X'X' < \ Yf' a Y'X U' a H U'g' b g'YZYZZVMMW' g' U'g'f'W'U'X' k h' \ \ Yf' Y' W'f'j Y' UbX' c'f Y'f b d'f'c'V' Ya g' Z'f' Z'a U'Y'g'z' UbX' \ \ Yf' U'Y'f b d'f'c'V' Ya g'Z'f' a U'Y'g'
K i UbX'7\ Yb fRS%L	< \ Yf'9Xi W qcb	H\Ycfm' cZ' U'f'f'qcb' UbX' a YHU'f'f'qcb' UbX' YbX'Y' X Z'fY'YbW'g	Ei Ub H U j Y'UddfcUW	

% "Gh Xbhb| U Ya Ybh

Df]cf'gWc'Uf'mgh X]Yg'cb'Yb| U Ya Ybh\Ug'fYj YUYX'hk c'a U]b'X]a Ybg]cbg!']b!WUgg'ftf'UMXYa]W/ Yb| U Ya Ybh UbX' ci HcZWW'gg' Yb| U Ya Ybh h'Uh UFY YggYbh|U']b' Yl d'U]b|b| ' h Y]bX]j]Xi U' UbX' Wbhl li U' ZM'f'g]b' fYU]cb']c' h'Y Yb| U Ya YbhX]g'Wi fg'f'p i \ž&S' E' 7cbWf]b| ' h'Y UMXYa]W X]a Ybg]cbž F U]a]' Yh U'" fRS% E Uf| i Y h'Uh YZYM]j Y gi Xyblg' Yb| U Ya Ybh HU' Yg' d'UW' k \ Yb' 'YufbYfg' Wbgfi W' h'Y]f' dYfg'cbU' 'Yufb|b| ' Ybj]f'c'ba Ybh]d@9L'h'fci [\ 'W'a a i b]W]cb' V]k Yb' ZW]H'U'c'f'g' UbX' gi Xyblg' H']g' Ugg'f]h'cb' X'Ya cbg'f'U'g' h'Y]a dcf]UbW' cZ h'Y fYU]cbg']d' V]k Yb' gi XybhYb| U Ya YbhUbX' h'Y 'Yufb|b| ' Ybj]f'c'ba Ybh' @Uk' g'cb' UbX' A Ugnb' fRS% E Ya d' Ugn'YX' 'U]h'bh d'f'c'Z' Y UbUng]g' ZM'f'g' !' Wbhl]ž a c]h] U]cb' f'g'Ybg' cZ VYcb|]b| ' cf' g'Y'ZUgg'Ygg'X' W'a dYh'W'W' VY]Yžž Yb| U Ya Yb]ž UbX' ci h'W'a Y U'g' Ygg'Ybh|U' W'a d'cb'Yblg' cZ gi Xyblg' Yb| U Ya Ybh' : cf' h'Y W'ff'Ybh]gi Xnž gi XybhYb| U Ya Ybhk U'g' W'W'W'dli U]n'YX' V]k U]c'Z h'f'Y' a U]b' a]W'c'! Ybj]f'c'ba Ybh ZM'f'g' W']b]h]j Yž VY U]c'f'U' UbX' fYU]cbU'" B'cf'h' Ym' Yh U'" fRS% ž d' &&L' g'ck' h'Uh g'gi Xybh]b]h'f'U]cb' UbX' d'f]h]V]d'U]cb']b' 'Yufb|b| ' UM]j]h]Yg' UfY]a dcf]Ub]h'Z'f' Yb| U Ya YbhUbX' UMXYa]W ci h'W'a Yg'k \]' YdYf'W]j YX' Yb| U Ya Ybh]b' h'Y 'Yufb|b| ' d'f'c'W'gg' \ U'g' Udcg]h]j Ya YX]U]b| ' W'bl'f'c' 'cb' [YbYfU' UMXYa]W'ci h'W'a Yg'"

% "&"Gh Xbhb| U Ya Ybh

HYWbc'c| mi 'Yufb|b| ' Ybj]f'c'ba Ybh]g' W'U'f'U]M]n'YX' Vm X]Z]f'Ybh g'ng]h'a g' g' W' U'g' @Yufb|b| ' A UbU' Ya Ybh Gng]h'a 'f@A Gž 7ci fg'Y' A UbU' Ya Ybh Gng]h'a 'f'f' A Gž J]f]i U' @Yufb|b| ' 9bj]f'c'ba Ybh f] @9L'cf' Yj Yb' U' ? bck' YX] Y A UbU' Ya Ybh Gng]h'a 'f'p' A Gž h'Uh U' 'g'f]j Y U'g' d' U]ž'f'a g'ž'f' h'UW]b| ' UbX' 'Yufb|b| ' UM]j]h]Yg'f'a ccf'Y'Yh U'ž&S%&L' H']g' gi Xmi Xybh]Z]Yg'lk c' g'f'UbX'g'c'Z h'Y cb']bY' 'Yufb|b| ' Ybj]f'c'ba Ybh]' h'Y g' UfYX' 'Yufb|b| ' Ybj]f'c'ba Ybh UbX' h'Y d'Yfg'cbU' 'Yufb|b| ' Ybj]f'c'ba Ybh]d@9L' 7cbWf]b| ' h'Y g' UfYX' 'Yufb|b| ' Ybj]f'c'ba Yb]ž h'Y U]j Ub]U' Yg' cZ Yb| U Ya Ybh]b' 'cb']bY' 'Yufb|b| ' Ybj]f'c'ba Yblg']bW' XY' d'f'c]j]X]b| ' 'YufbYfg' k]h']bW'U'g'X' U' h'c'ba nž W' 'U'cf'U]cbž W'U]h]]mi f'Ygg'cb' Yh U'ž &S% E UbX' Z]]V]]mi]b' h'Y 'Yufb|b| ' d'f'c'W'gg' > Ygg'cb' Yh U'" fRS% E W'W'W'dli U]n'Y h'Y X]]h'U' 'Yufb|b| ' Ybj]f'c'ba Ybh Vmi g]b| ' X]]h'U' X]j]W'g']b]h'f'U]cbž g' UfYX' d'YXU' c| mi UbX']bW'U'g'X' W' 'U'cf'U]cb']c' Yl d']W'Y'YZYM]j Y 'Yufb|b| ' d'f'U]W'g']g]b| ' h'Y h'f'a j]f]i U' 'Yufb|b| ' Ybj]f'c'ba Yblg' f] @9L' f'cf'Ym' / ' Fcgž &S% E Uf| i Y h'Uh h'Y 'Yufb|b| ' Ybj]f'c'ba Ybh Wi 'X' VY W'bg]XYfYX' U'g' U X'Ya c'W'U]WYXi W]cbU' g'Y]h]b| ' h'Uh g' d'cf]f'g' h'Uh U]j UbW'a Ybh cZ W' 'U'cf'U]h]j Y 'Yufb|b| ' UbX']b]h'f'U]cbg' V]k Yb' 'YufbYfg' UbX' h'UW'Yfg' : b' U d'f'Yj]ci g' gi Xnž G']b]Yf' UbX' D]h'Yf' fRS% &L' Uf| i Y h'Uh h'Y W'bhl li U' ZM'f'gž U'g'c' fYZf'fYX']c' U'g' h'Y Yb| U Ya Ybh ZW]H'U'c'f'g' Yl d' U]b' h'Y Ybj]f'c'ba Ybh U' ZM'f'g' h'Uh g' d'cf]h' h'Y X]j Yc'da Ybh cZ h'Y _bck' YX] Y UbX' g']' g' cZ gi Xyblg' G]a]'f' nž A Ubk Uf]b| ' Yh U'" fRS% E Yl d' U]b' h'Uh h'Y Ybj]f'c'ba Ybh U' ZM'f'g' W'bg]gi cZ 'Yufb|b| ' UM]j]h]ž W'Ugg' g]n'Y UbX' h'Y a cXY' cZ XY]j Ym]f'eb']bY' cf' ZM'!]c' ZM' H' Y X]j Yc'da Ybh cZ h'Y d'Yfg'cbU' 'Yufb|b| ' Ybj]f'c'ba Ybh U'g' Yj c]j YX']c']bW' XYW]h]W']c' Yg' g' W' U'g' gi Xyblg' U'g' d'f'c'Xi W'f'g' cZ W'bl'Yblž gi Xyblg' U'g' g'V]U]n'Yf'gž UbX' gi Xyblg' U'g' XYW]g]cb' a U' Yfg']b' h'Y cb']bY' 'Yufb|b| ' Ybj]f'c'ba Ybh]f'U']a]' Yh U'ž&S% E' H' Y W'W'W'dh'c'ZD@9' Wi 'X' U'g'c' VY']b' YX']c' k \ UhD'f'Ya 'Uh U'UbX' ; Yh U' fRS% E fYZf']c' U'g' U]U]h]j Y Y' 'Yufb|b| ' Ybj]f'c'ba Ybh h'Uh W'bg]gi cZ d'Yfg'cbU' a c]h] U'cf'gž 'Yufb|b| ' c'V]W]j Yg' UbX' 'Yufb|b| ' g'mY' : cf' h'Y W'ff'Ybh]gi Xnž h'Y cb']bY' 'Yufb|b| ' Ybj]f'c'ba Ybh]g' W'W'W'dli U]n'YX' U'g' h'Y [YbYfU' 'Yufb|b| ' Ybj]f'c'ba Ybh UbX' h'Y d'Yfg'cbU' 'Yufb|b| ' Ybj]f'c'ba Ybh' < % : H' YfY]g' U' d'cg]h]j Y fYU]cbg']d' V]k Yb' 'cb']bY' 'Yufb|b| ' Ybj]f'c'ba Ybh UbX' gi Xybh Yb| U Ya Ybh' <<

% " " :bgfi W]cbU'fYgci fWg'

=bgfi W]cbU' fYgci fWg' W'bg]g'h'c'Z' Yufb|b| ' h'Wbc'c|]Yg' g' W' U'g' 7U]j U'gž : U'W'cc_žD]U]n]žG' n'Y]b' h'Y 7 U'g'f'c'ca ž 6' U'W'V'c'U'X' 'Yufbž H'cd' < Už M'ci H' Vž Hk]h]fž D]b]h'f'Ygž @Yufb|b| ' A UbU' Ya Ybh Gng]h'a g' UbX' A ccXY' < ck Yj Yž h'Y]a dcf]UbW' cZ]bgfi W]cbU' fYgci fWg' [cYg' V]n'ebX' h'Y d'f'c]j]g]cb' cZ h'Wbc'c|]Yg' f'Yei]fYX'ž'f' h'UW]b| ' UbX' 'Yufb|b| ']c']bW' XY h'Y YZYM]j YbYgg' cZ h'Y X]j]W'g']b' Yb| U]b| ' gi Xyblg' UbX' d'f'c]j]X]b| ' h'Ya 'k]h']a dcf]Ub]h' 'Yufb|b| ' Yl d'Yf]YbW'g' f] Yf| i g'cbž &S% &L' Df]cf' gi Xmi Vmi ; i d'f'U' UbX' D'UbXYmi fRS% E g'ck' h'Uh gi Xyblg' Yb| U Ya Ybh]b' 'Ub' 'cb']bY' 'Yufb|b| ' Ybj]f'c'ba Ybh]g' d'cg]h]j Ymi]b]Zi YbW'X' V]c]b']bY' 'Yufb|b| ' fYgci fWg' h'Uh UFY]b]h' YW' U' mi

UbX UMXá JW`m g`ha i `U`h|b| " 7cbj YfgYnz`h Y`UW` cZ`YUfb|b|` fYgci fWg`Wi`X` UZZM`cb`|bY` hUW|b|` UbX`YUfb|b|`": cf`|bg|UbWZ`A i`hgnU`UbX`A`U`c`_`Uz`&S%`E`g`ck`h`U`h`U`MX`á`|W`g`k`c`
H|`[\`h`f`c`i`[\`cb`|bY`YUfb|b|`a`c`XYg`|X`Y`b`h`Z`Y`X`Y`U`j`mk`cf`_`c`UXz`UW`cZ`|b`h`f`b`Y`h`W`b`b`Y`M`j`|`m`i`b`X`
d`c`c`f`f`Y`a`i`b`f`U`h`c`b`Z`c`f`X`Y`Y`c`d`|b|`cb`|bY`YUfb|b|`W`b`h`b`h`U`g`g`c`a`Y`c`Z`h`Y`Z`M`f`g`h`U`h`U`Z`M`c`b`|bY`
YUfb|b|`|b`?`Y`b`n`U`b`I`b`|j`Y`f`g`h`Y`g`": i`f`h`Y`f`a`c`f`Y`z`|b`U`X`Y`e`i`U`Y`U`v`c`f`U`c`f`|Y`g`U`b`X`U`U`W`c`Z`W`a`d`i`h`f`g`
U`b`X`U`d`l`c`d`g`f`A`i`h`g`n`U`/`A`U`c`_`U`z`&S%`E`W`i`X`U`g`c`U`Z`M`c`b`|bY`h`U`W`|b|`UbX`YUfb|b|`H`Y`
U`d`d`|W`h`c`b`c`Z`YUfb|b|`fYgci fWg`Wi`X`U`h`f`h`Y`YUfb|b|`d`f`U`M`|W`g`U`b`X`d`U`h`f`b`g`|b`U`h`W`b`c`c`|`m`i`
a`Y`X`|U`h`X`YUfb|b|`Y`b`|f`c`b`a`Y`b`h`f`@`C`E`Y`n`!`D`f`Y`n`Y`h`U`"z`&S%`E`H`Y`7`C`J`-8`!`%`d`U`b`X`á`|W`f`c`i`[\`h`U`v`c`i`h`
g`l`c`b`h`U`b`Y`c`i`g`f`Y`U`M`|c`b`g`Z`c`a`g`c`a`Y`Y`U`X`Y`g`c`Z`<`9`-`g`d`U`f`h`W`U`f`m`V`W`i`g`Y`c`Z`f`Y`g`c`i`f`W`U`b`X`h`W`b`|W`
W`U`Y`b`|`Y`g`"

7cbgYei Ybhnz`h`|g`g`h`X`m`n`d`c`h`Y`g`g`Y`g`h`U`h`

< &`H`Y`f`Y`|g`U`d`c`g`h`j`Y`f`Y`U`h`c`b`g`|d`V`h`k`Y`b`|b`g`f`i`W`|c`b`U`f`Y`g`c`i`f`W`g`U`b`X`g`i`X`Y`b`h`Y`b`|`U`Y`a`Y`b`h`"

%`"``"b`g`h`i`h`c`b`U`g`d`d`c`f`h`g`h`á`g`

H`Y`f`Y`g`d`c`b`g`Y`c`Z`Y`U`X`Y`g`c`Z`<`9`-`g`l`c`X`Y`d`c`m`i`|b`h`f`j`Y`b`h`c`b`g`h`U`h`U`X`f`Y`g`g`h`Y`|a`a`Y`X`|U`Y`b`Y`X`g`c`Z`
g`h`i`X`Y`b`g`X`i`f`|b|`h`Y`d`U`b`X`á`|W`X`á`c`b`g`f`U`h`g`h`Y`|a`d`c`f`U`b`W`c`Z`|b`g`h`i`h`c`b`U`g`f`i`W`i`f`Y`g`z`c`|W`g`U`b`X`
U`X`a`|b`|g`f`U`h`j`Y`k`|`d`c`k`Y`f`l`c`f`Y`g`d`c`b`X`l`c`Y`a`Y`f`|Y`b`W`|g`"D`c`f`h`f`Y`h`U`"f`&S%`E`d`c`g`h`h`U`h`g`f`i`W`i`f`Y`z`
g`f`U`M`|`m`i`b`X`g`d`d`c`f`h`W`b`g`h`i`h`Y`g`g`Y`b`h`U`Z`M`f`g`Z`c`f`X`Y`Y`c`d`|b|`h`W`b`c`c`|`n`i`a`Y`X`|U`h`X`YUfb|b|`
Z`U`a`Y`k`c`f`_`|b`Y`X`i`W`h`c`b`U`|b`g`h`i`h`c`b`g`"D`U`f`h`W`U`f`n`z`|b`g`h`i`h`c`b`U`g`f`i`W`i`f`Y`f`d`c`f`h`f`Y`h`U`"z`&S%`E`
g`f`j`Y`g`U`g`h`Y`W`b`h`M`h`h`U`i`g`d`d`c`f`g`Y`U`b`|b|`U`b`X`h`|g`|b`W`X`Y`d`c`|W`i`c`b`h`W`b`c`c`|`m`i`g`U`Y`Z`h`U`W`|b|`
U`b`X`YUfb|b|`d`|`c`g`d`n`z`|`c`j`Y`f`b`U`b`W`U`b`X`U`g`Y`g`g`a`Y`b`h`c`Z`g`i`X`Y`b`g`d`Y`Z`c`f`a`U`b`W`H`Y`g`d`d`c`f`h`Z`M`f`
Y`l`d`U`b`g`h`Y`h`W`b`|W`U`b`X`d`Y`X`U`c`|`J`W`g`d`d`c`f`h`U`g`k`Y`U`g`|b`g`h`i`h`c`b`U`|b`W`b`h`j`Y`g`l`c`d`f`c`a`c`h`Y`
c`b`|bY`YUfb|b|`f`i`f`U`U`a`z`&S%`E`K`|`Y`h`Y`h`f`Y`M`Z`M`f`Z`U`a`Y`k`c`f`_`d`f`c`j`X`Y`g`f`Y`Y`U`b`h`|b`Z`c`f`a`U`h`c`b`
c`b`h`Y`U`X`c`d`h`c`b`c`Z`U`g`f`i`W`i`f`Y`Z`c`f`h`W`b`c`c`|`n`i`a`Y`X`|U`h`X`YUfb|b|`z`|h`X`c`Y`g`b`c`h`d`f`c`j`X`Y`|b`Z`c`f`a`U`h`c`b`
c`b`W`g`g`f`c`c`a`Z`M`f`g`h`U`h`U`Y`d`U`f`h`W`U`f`m`|a`d`c`f`h`b`h`Z`c`f`h`Y`h`U`W`|b|`UbX`YUfb|b|`d`f`c`W`g`g`Y`g`
7cbgYei Ybhnz`h`|g`g`h`X`m`d`c`g`h`U`h`g`h`U`h`

<`'`H`Y`f`Y`|g`U`d`c`g`h`j`Y`f`Y`U`h`c`b`g`|d`V`h`k`Y`b`|b`g`h`i`h`c`b`U`g`d`d`c`f`h`g`h`á`g`U`b`X`g`i`X`Y`b`h`
Y`b`|`U`Y`a`Y`b`h`"

%`"``")`"H`W`b`c`c`|`m`i`g`Y`Z`Y`Z`M`f`h`i`

H`W`b`c`c`|`m`i`g`Y`Z`Y`Z`M`f`h`i`|b`h`Y`W`b`h`M`h`c`Z`c`i`f`g`h`X`m`|g`j`Y`f`m`|a`d`c`f`h`b`h`X`i`Y`l`c`h`Y`W`U`Y`b`|`Y`g`
g`h`i`X`Y`b`g`Z`U`W`|b`X`Y`Y`c`d`|b|`h`Y`f`W`|b`|h`j`Y`U`M`|h`Y`g`i`g`|b|`h`W`b`c`c`|`m`i`|b`h`Y`f`YUfb|b|`d`f`c`W`g`g`Y`g`
H`Y`f`a`g`g`W`U`g`W`a`d`i`h`f`Y`Z`M`f`h`i`f`k`c`k`U`X`Y`h`U`"z`&S%`E`c`f`h`W`b`c`c`|`m`i`g`Y`Z`Y`Z`M`f`h`i`U`j`Y`V`Y`b`i`g`X`
|b`X`|Z`Z`f`Y`b`h`g`i`X`|Y`g`l`c`X`Y`g`M`|V`Y`|b`X`j`|X`i`U`'1`X`|a`Y`b`h`|b`h`Y`U`d`d`|W`h`c`b`c`Z`h`W`b`c`c`|`m`i`|b`YUfb|b|`"
:`c`f`h`Y`d`i`f`d`c`g`Y`c`Z`h`|g`g`h`i`X`n`z`h`Y`h`f`a`h`W`b`c`c`|`m`i`g`Y`Z`Y`Z`M`f`h`i`g`i`g`X`X`i`Y`l`c`h`Y`V`f`c`U`X`g`W`d`Y`c`Z`
h`W`b`c`c`|`m`i`g`U`Y`U`b`X`|l`g`U`d`d`|W`h`c`b`k`|h`c`h`Y`f`l`c`c`g`|b`h`Y`c`b`|bY`YUfb|b|`Y`b`|f`c`b`a`Y`b`h`K`|`Y`
h`W`b`c`c`|`J`W`U`X`j`U`b`W`g`W`b`h`b`i`Y`l`c`U`h`f`h`Y`k`U`m`|b`X`j`|X`i`U`g`W`a`a`i`b`|W`h`Z`g`V`U`|g`Y`U`b`X`YUfb`
f`C`k`i`g`!5`[`n`'á`U`b`/`@`U`V`|`G`|`U`k`z`&S%`+/`F`Y`n`b`U`Y`h`U`"z`&S%`E`z`|h`U`g`V`W`a`Y`b`Y`W`g`g`f`m`i`l`c`Y`l`U`a`|b`Y`c`k`
h`W`b`c`c`|`m`i`g`Y`Z`Y`Z`M`f`h`i`a`c`X`Y`f`U`h`g`g`h`i`X`Y`b`h`Y`b`|`U`Y`a`Y`b`h`U`b`X`h`Y`YUfb|b|`Y`b`|f`c`b`a`Y`b`h`|b`U`|`|`Y`f`
Y`X`i`W`h`c`b`g`h`|b|`"<`|`|`Y`b`X`h`W`b`c`c`|`m`i`g`U`Y`U`g`c`X`Y`d`Y`X`c`b`h`Y`|b`g`f`i`W`|c`b`U`f`Y`g`c`i`f`W`g`h`U`h`U`Y`
a`U`X`Y`U`j`U`U`V`Y`l`c`g`h`i`X`Y`b`g`f`@`U`V`|`G`|`U`k`/`C`k`i`g`!5`[`n`'á`U`b`z`&S%`+/`D`c`f`h`f`Y`h`U`"z`&S%`E`U`g`k`Y`U`g`h`Y`
X`Y`Y`c`d`a`Y`b`h`c`Z`U`W`b`j`Y`b`|Y`b`h`Y`b`j`|f`c`b`a`Y`b`h`h`U`i`g`d`d`c`f`h`h`Y`Y`l`W`U`|`Y`c`Z`_`b`c`k`Y`X`|`Y`f`b`|b|`Y`h`U`"z`
&S%`/`@`C`E`Y`n`!`D`f`Y`n`Y`h`U`"z`&S%`E`":`c`W`g`|b|`cb`U`X`|Z`Z`f`Y`b`h`a`|l`z`@`|b`U`b`X`K`U`b`|`f`&S%`E`d`c`g`h`h`U`h`|b`_`
V`h`k`Y`b`h`g`!h`W`b`c`c`|`m`i`Z`|z`d`Y`W`j`Y`X`i`g`Z`b`Y`g`g`c`Z`h`W`b`c`c`|`m`i`U`b`X`W`b`h`b`i`Y`X`|b`h`b`h`c`b`l`c`i`g`Y`
g`f`j`Y`U`g`a`c`h`j`U`h`c`b`Z`c`f`h`Y`U`X`c`d`h`c`b`c`Z`h`W`b`c`c`|`m`i`|b`U`h`W`b`c`c`|`n`i`a`Y`X`|U`h`X`YUfb|b|`
Y`b`|f`c`b`a`Y`b`h`H`Y`W`f`f`Y`b`h`g`h`i`X`m`d`c`g`h`U`h`g`h`U`h`h`Y`g`f`c`b`|`Y`f`h`Y`h`W`b`c`c`|`m`i`g`Y`Z`Y`Z`M`f`h`i`h`Y`
g`f`c`b`|`Y`f`h`Y`f`Y`U`h`c`b`g`|d`V`h`k`Y`b`h`Y`c`b`|bY`YUfb|b|`Y`b`|f`c`b`a`Y`b`h`U`b`X`g`i`X`Y`b`h`Y`b`|`U`Y`a`Y`b`h`
G`Y`W`b`X`n`z`h`Y`g`f`c`b`|`Y`f`h`Y`h`W`b`c`c`|`m`i`g`Y`Z`Y`Z`M`f`h`i`h`Y`g`f`c`b`|`Y`f`h`Y`f`Y`U`h`c`b`g`|d`V`h`k`Y`b`
|b`g`f`i`W`|c`b`U`f`Y`g`c`i`f`W`g`U`b`X`g`i`X`Y`b`h`Y`b`|`U`Y`a`Y`b`h`8`f`U`k`|b|`Z`c`a`h`Y`|h`f`U`h`Y`Z`h`|g`g`h`i`X`m`
n`d`c`h`Y`g`h`Y`g`h`Y`Z`c`k`|b|`

<`(`U`h`W`b`c`c`|`m`i`g`Y`Z`Y`Z`M`f`h`i`a`c`X`Y`f`U`h`g`h`Y`f`Y`U`h`c`b`g`|d`V`h`k`Y`b`h`Y`c`b`|bY`YUfb|b|`
Y`b`|f`c`b`a`Y`b`h`U`b`X`g`i`X`Y`b`h`Y`b`|`U`Y`a`Y`b`h`"

< (V. HWbc`c[migYZYZWMMia cXYUhg`h YfYUjcbg`jd`Vyk Yb`]bgfi WjcbU`fYgci fWg`UbX`
gi XYbhYb[U Ya Ybh`

FYg` Hbhnzh YgfYb[h`cZdcghj YfYUjcbg`jd`Vyk Yb`U`cb`]bY`YUfb]b[`Ybj]fcbá YbhUbXVÉ`
=bgfi WjcbU`fYgci fWg`UbX`gi XYbhYb[U Ya Ybh]g[fYUhf`k `Yb hWbc`c[migYZYZWMMig`\\`

&'A Yh cX

5`ei Ubh]Hj YfYgUFW`UddfcUW`k Ug`i g`X`hc`[Uh Yf`UbX`UbUmY`Ya d]f]W`XUUFca`gi XYblg`]b`
U`HWb]W`I`blj Yfg]m]b`]; `UbU`H`Y`fYgUFW`a`Yh`cX`c`[mi`g`X`]b`h`lg`gi`Xm]g`Wbglgh`bhik`]h`
h`Y`df]cf`dfcW`Xi`fYg`i`g`X`]b`WbXi`W]b[`ei Ubh]Hj YfYgUFW`]b`U`\\`Yf`YXi`W]cb`g`H]b[`":`cf`
]bg]UbWZ<`Ybf]Y`hU`"f8S%)`E`U`YUf[i`YX`h`Uh`h`Ya`YUj`fYg`i`g`X`]b`hWbc`c[`má`YX]U`hX`YUfb]b[`Ybj`
]fcbá`Ybhg`ci`XVYU`XU`hV`Y`h`h`Yi`b]ei`YWU`Yb[`Yg`cZ`h`Y`gi`XYblg`UbX`h`Y`Wbhl`hgi`X]YX`"

&%"DUfh]VdUblg`

H`Y`dcdi`U`jcb`cZ`h`Y`WffYbhgi`Xm`Wbhl`hk`YfY`%`'`gi`XYblg`k`\\`c`k`YfY`Ybfc`YX`]b`X]Z`fYbh`
dfc[`fU`a`Yg`]b`Zei`f`U`W`X`Ya`]Vg`Wcc`g`]b`U`H`Y`Wb]W`I`blj`Yfg]m]b`]; `UbU`H`Ya`cXY`cZ`H`U`W]b[`U`
bX`YUfb]b[`k`Ug`h`fci`[`cb`]bY`YUfb]b[`a`cXY`I`g]b[`U`dfcVU`]`]m]g]á`d`]b[`a`Yh`cX`fg]á`d`Y`
fUbXca`g]á`d`]b[Ezh`YfYgUFWYfg[`Uh`YfYX`XUUFca`(`+`gi`XYblg`"Ci`hcZ`h`Y,`SS`ei`Yg]cb`b]UfYg`
X]gf]Vi`hX`hc`Y`Y`&SS`UbX`'`SS`gi`XYblgZ`(`+`k`YfY`fYf]Y`YX`fYdfYgYbh]b[`)`("S`"5`gcz`h`Y`
bi`a`Vf`cZ`j`U]X`g`fj`YmfYg]cbgYg`k`Ug`(&`UbX`h`lg`fYdfYgYbhX`Uj`U]X`fYg]cbgY`fUY`cZ)`"%1`"
8`Ya`c[`fU`\\`]W`W`U`F`U`M`f]g]Vg`cZ`h`Y`dUfh]VdUblg`k`YfYdfYgYbhX`]b`HUV`Y`&"

HUV`Y`&`

8`Ya`c[`fU`\\`]W`W`U`F`U`M`f]g]Vg`cZ`dUfh]VdUblg`

.. *Bi`a`Vf`cZ`dUfh]VdUblg`"`DYfWb]U`YcZ`dUfh]VdUblg`f]`E`*

;`YbXf`

A`UY`)`·`)`",`·`
:`Ya`UY`	&`\$`)`("°&`

GWcc`·`

GWcc`·`cZ5`dd`]YX`G]YbWg`UbX`HWbc`c[`mi`	%&`·`	&`",`·`
GWcc`·`cZ5`dd`]YX`5`flg`)`,`·`	%`"°(`·`
GWcc`·`cZ9b[`]bYf]b[`·`	%&S`·`	&`"°&`·`
GWcc`·`cZ6i`g]bYgg`UbX`A`UbU`Ya`YbhGi`X]Yg`	%&S`·`	&`"°&`·`

=b`hfa`g`cZ`h`YX]gf]Vi`hcb`cZ`dUfh]VdUblg`Vmi`h`YXy`]Wg`h`Ymi`gZ`h`Ybi`a`Vf`cZ`dUfh]VdUblg`
k`\\`c`]bX]W]hX`h`Uh`h`Ymi`gY`a`cV]`Y`d`cbY`Zf`h`Yf`YUfb]b[`k`Ug`'`&`k`\\`W`fYdfYgYbh+*1`cZ`
dUfh]VdUblg`7`cbj`YfgYnz+,`dUfh]VdUblg`f%`")`1`E`UbX`&`f]`(*)`1`E`dUfh]VdUblg`]bX]W]hX`h`Uh`h`Ymi`
i`gX`7`ca`di`hf`U`h`cdg`UbX`HUV`YgZf`YUfb]b[`cb`]bY`"

&&'=bgfi`a`Yblg`

H`Y`]bX`Yd`YbX`Ybh`j`Uf]U`V`Yg`]b`h`Y`gi`Xm`U`fY`h`Y`cb`]bY`YUfb]b[`Ybj`]fcbá`Yb]z`]bgfi`WjcbU`
fYgci`fWg`UbX`]bg]h`i`hcbU`g`ddcfhig]h`Ya`g`UbX`]b]fj`Ybhcbg`"Gi`XYbhYb[U Ya Ybhg]fj`YX`Ug`h`Y`
X`Yd`YbX`Ybhj`Uf]U`V`Yk`\\`]`YhWbc`c[`migYZYZWMMig]fj`YX`Ug`h`Ya`cXYUj]b[`j`Uf]U`V`Y`"

&&'%Gi`XYbhYb[U Ya Ybhia`YUj`fYg`·`

Gi`XYbh`Yb[U Ya Ybh`k`]h`hWbc`c[`m`fYZf`g`hc`h`Y`]bj`c`j`Ya`Ybh`cZ`gi`XYblg`]b`hWbc`c[`m`
a`YX]U`hX`dfcWgg`cZ`YUfb]b[`fk`ck`UFX`YhU`z`&S`%`E`H`Y`Yb[U Ya YbhWb]gf]i`W]k`Ug`XYf]j`YX`Zca`
h`Y`<`[\\`Yf`9Xi`W]cb`Gi`XYbh9b[U Ya YbhG]WYfk`9C9GLf`n`cW`&S`%`E`H`Y`Wb]gf]i`W]Wb]g]hX`cZ`
%&]h`á`g`cb`]bY`Yb[U Ya YbhWb]g]hX`cZ`Zei`f`]h`á`g`W[`b]h]j`Y`Yb[U Ya YbhG]WY`Wb]g]hX`cZ`Zei`f`
]h`á`g`UbX`/`gc`WU`Yb[U Ya Ybh`k`]h`dYf`g`WY`Wb]g]hX`cZ`Zei`f`]h`á`g`"G]á`d`Y`]h`á`g`k`YfYz`Î`=

fY[i 'U'`mi gY'k YWVUgYX' fYgci fWg'UbX']bZ'fa U]cb' XYg[bYX' gdYVZVW' miZ'f' h Y Wi fgY' UbX' I = ZbX'a miWi fgYg]bh' YMi U'`mg]a i 'U]b[I' ftr = 0.905E''

&''&'HWbc`c[mgYZYZVMM'a U]g' fYg'

GYZYZZVMM'h Uh]g'h Ya cXYU]b[j Uf]UVY]b'h]g'g]i Xm]g'h Y WfY cZ6UbXi fUg'g'Vc!W[b]h]j Y h Ycfmi h UhYa d\UgnYg'h YcVgYf] U]cbU' fc' YcZ'YUfb]b['UbX'gc'VU' Yl dYf]YbW]]b'h YXYj Ycda Ybh cZ\i a Ub' dYf'gcbU]hm' H'Y HWbc`c[mgYZYZVMM'i Wb]gfi W'Wb]g]hX' cZ]j Y]h'a g' H'fY Y]h'a g' k YFYXf]j YX'Z'ca 'h Y7ca di hf#HWbc`c[mgYZYZVMM'i Wb]gfi W'VmiA Ubk Uf]b['YhU' fR\$%+L'UbX' h'Y ch'Y' f'k c'Z'ca 'h Y7ca di hf#-bhYbYhg'YZYZVMM'h Wb]gfi W'Vmi < i b['YhU'' fR\$%SE'' GLa d'Y]h'a 'k UgZ' I = Ua 'WdUV'YcZi g]b['h Y]bhYbYhlc ZbX']bZ'fa U]cb' = bYX' I' ftr = 0.882E''

&''&' -bg]h] h]cbU' g' ddcfhng]h'a g'UbX']bh]f] Ybh]cbg'

H'Y]bg]h] h]cbU' g' ddcfhng]h'a g'UbX']bh]f] Ybh]cbg' Wb]gfi W'f]j Y]h'a g' k Ug' Xf]j YX'Z'ca 'h Y]bg]h] h]cbU' dYgYbW'Wb]gfi W'VmiG']b' UbX'7 \Ub' fR\$S(E' GLa d'Y]h'a 'k UgZ' I = VY]Yj Yh'Ughi XYbh g' ddcfh] g'UZZ UY' k]']b['lc' \Yd' a Y]Z = \Uj Y h'Wb]W' d'fcVYa g' k \] Y HU']b['h Y Wi fgY' I' ftr = 0.912E''

&''(-bg]fi W]cbU' fYgci fWg'

H'Y]bg]fi W]cbU' fYgci fWg' Wb]gfi W'Wa d]gYX' cZ]g] ']h'a g' :]j Y cZ]h'a g' k YFY cMU]bYX'Z'ca ' 5 \UYV'UbX'F'ck 'Yng' fR\$% E'Y' YUfb]b['ng]h'a g'UbX'Cb']bY' YUfb]b['fYgci fWg' Wb]gfi W'k \] Y h'Y 'U]h]]h'a 'k Ug' Xj YcdYX'Z'ca 'h Y ']h'U'fY'' GLa d'Y]h'a 'k UgZ' I = fYW]j Y Z'Yei Ybh W'a a i b]W]h]cb'fY] UFX]b['bYk ' YUfb]b['a U]f]Ug'cb']bY' I' ftr = 0.909E''

&''&' Cb']bY'YUfb]b['Yb]]f'cba Yb]h'a U]g' fY

H'Y cb']bY' YUfb]b['Yb]]f'cba Ybh Wb]gfi W' Wb]g]hX' cZ'Z'ci f']h'a g' 5 ' h'Y Z'ci f']h'a g' k YFY cMU]bYX'Z'ca 'h Y Yb]]f'cba Ybh]g]fi W'f]b['Wb]gfi W'Vmi6Uf]bUFX'YhU'' fR\$S- E' GLa d'Y]h'a 'k UgZ' I = i g' U' mZ]bXU'Wa Z'f]h'U'Yd' U'W'lc' g]i Xm]Z'f' a miCb']bY'Wi fgYg' I' ftr = 0.819E''

&''* "7cb]fc' j Uf]UVYg'

H'Y Wb]l'fc' j Uf]UVYg'Z'f' h']g'g]i Xm]k YFY a UXY' i d'cZU' YZ[YbXYf'Z'dfc[fUa a YcZ]g]i Xm]UbX' hnd'YcZ Xj]W' 5 [Y k Ug' W]M] cf]nX' VUgYX' cb' b]bY XYG]d]h]cbg'' : cf' h'Y di fdcgYg' cZ' h'Y fY] fYgg]cb' UbUngYgZ']bX]W'cf' j Uf]UVYg' fXi a a miWXYg' k YFY W]U]X' k]h' fYZ]fYbW' W]M] cf]Yg' Ug' Z' `ck g' [YbXYf' fZ'a UYg' / U Y fR' !&L/ U]WXYa]Wg'Wcc' `fG5 GH'L' UbX' hnd'Y cZ' YUfb]b['XYj]W' f'a cV]Y d\cbY' dYUf'gcb' YhU'' fR\$S' E'g'ck 'h'UhU' YUbX' [YbXYf' \Uj YUX]fW]]bZi YbW'cb'Ub']bX]j]Xi U'g' W'a di hf' YZ]VMM'i 5 ' h'Y Wb]g]fi W]g]]b'h Yg]i Xm]k YFY [U [YXi g]b[U) !dc]bh@_ YfhgWYk \fY% fYdfYgYbhX']g]fcb['m]X]g]U' fY' UbX') fYdfYgYbhX']g]fcb['m]U' fY''

&' "D'fcW]Xi fY'

5' dUdYf!UgYX' g' f] Ym]k Ug' U]a]b]g]h'fYX']b' : Wfi Ufm]UbX' h'Y Z'f]g]k Y'Y' cZ'A UFW' &S% U]h'Y i b]j Yf]g]h]m]Xi f]b['h'Y Wb]h'U]M]gYgg]cbg'cZ]g]i XYb]g'' 5 ' h'ci [\ h'Y XU]U'k Ug' W' Y]M]X'UhU]h'a Yk \ Yb' g]i XYb]g' \ U]X' a c]j YX'Z'ca 'h'Y cb']bY' YUfb]b['lc' h'Y V'YbXYX' a cXYZ' h'Y Z'W'g'cZ]h'Y g]i Xm]k Ug'lc' [Uh'Yf' h'Y Yl dYf]YbW'g'cZ]g]i XYb]g' Xi f]b['h'Y Z' ' !gWYcb']bY' YUfb]b['dYf]cX' H'Y fYZ'fYZ'g]i XYb]g' k YFY Yl d]W]h]m]]bZ'fa YX'lc' Ub]k Yf' h'Y]h'a g' VUgYX' cb' h'Y Yf' Yl dYf]YbW'g' Xi f]b['h'Y dYU' cZ]h'Y 7CJ -8!% dUbXYa]Wk \ Yb' h'Y m]k YFY YUfb]b[j]Uh'Y cb']bY' YUfb]b['a cXY' H'Y fYgYUfWYf'g'fY]YX' cb' h'Y g' ddcfh]cZ]Z]fYbh'Wi fgY' YMi fYf'g' UbX' g'Wcc' U]a]b]g]f'U'c'f'g'lc' Ugg]g]k]h' h'Y YMi fY g'WYXi 'Y cZ' dUf]h]V]dU]b]g' k \c' U]h]bXYX' h'Y a UbX'U'c'f]m] ZU]h'c'!ZUW' gYgg]cbg' cZ' h'Y Yf' W'f' fgYg'' DUf]h]W'U'f'nZ' h'Y fYgYUfWYf'g'fYei Yg]h'X'Z'f' V]k Yb' ('S'lc') S'a]bi h]g' U]M]f' YUW' WUgg'lc' X]g]f]V]i h'Y h'Yei Yg]h]cb]b]U'fYk \ YFYh' Ym]Ugc' \ U]X' h'Y cddcf]h] b]h]m]lc' Yl d'U]b' h'Y]h'a g'lc' h'Y dUf]h]V]dU]b]g' k \c' fYei]fYX' U]X]h]cbU' W'Uf]Z]W]h]cb'' -b']bY' k]h' h'Y]bg]h] h]cbU' 7CJ -8!% 'df'lc' W'g' h'Y g]i XYb]g' k YFY]bZ'fa YX'lc' a U]b]h]U]b' h'Y Yf' g'U]g' U']b'lc' h'Y g'U]h]b['Uf]U]b[Ya Yb]g' Xi f]b['h'Y Yf' YMi fY' gYgg]cbg'' G]i XYb]g' i gYX' V]k Yb') 'lc' () 'a]bi h]g'lc' d'fc]]XY' h'Y Yf' fYg]dcb]gYg'' Df]c]f'lc' W'a d'Y]h]b['h'Yei Yg]h]cb]b]U'fYz' dUf]h]V]dU]b]g' k YFY a UXY'lc' W'bgYbh]lc' h'Y Yf' dUf]h]V]dU]h]cb']b' h'Y g]i Xn]i H'Y XU]U

hUhk Ug[Uh fYXZca hYg fj Ymk Ug'UbUngYXi gbl' ghUghjW'a YhcXg'UbX'g'Zk UFY! GHUghjW' DUWU Y Zcf' hY GeVU' GMYbWg' fCGGL j Yfgcb' &+" -b' UWfXUbW k Jh' hY fi 'Yg' cZ Yh JW' WbgXYFUhcbz hY fYgUFWYfg' gci [\h jbg]h hcbU' Udfcj U' lc' WbXi W hY WffYbh fYgUFW" 5XX]hcbU'nz hY fUhcbUY cZ hY gh Xnz dchbhU' flj_g UbX' VbyZhg' Ug' k Y' Ug' hY f][\h cZ dUfhWUblg'lc k JhXfuk Zca hYgi Xmk fYfWU' mghU'X'cb hY jbgfi a Ybl'

&("8UU5bUnglg

HAYZfghghd'k Ug'lc' Yl Ua jbyhYXUHZcf' i blj Uf]Uy'cf' a i 'hj Uf]Uy' ci h]Yfg' i gbl' 'A U UbcV]g' X]g'Ubw'UbX'Vcl' d'clg" HAYfyg' lg'g'ck YX'h UihYXUUK Ug'bca U'mX]gf]m hX'UbX'h Uz'h fY k fY bc' i blj Uf]Uy' cf' a i 'hj Uf]Uy' ci h]Yfg'" HAY fYgUFWYfg' hYb' dfcWXX' lc' WbXi W WbZfa UcfmZMcf' UbUnglg' f7: 5EgdWZVW' mlt. %E'Y Ui UY'h Y gfi W fY cZ hY a Ylg' fYa Ybh a cXYg' &Lc' Yl d'Uj' hY Ugg' VU]hcb' Vhk Yb' hY dfYX]Wcf' j Uf]Uy' 9B; 'UbX'h YZci f'ci hWa Y j Uf]Uy'g' i' -BFz -CGZ HG9' UbX' 9BJ' UbX' / . 'lc' fY' YU' k \Yh Y' hY dfYX]Wcf' j Uf]Uy' UbX' hY ci hWa Yj Uf]Uy'g' fY'Ya d]f]W' mX]g]bWj Uf]Uy'g' j b' hY g'la d'Yk Yi gYX' Hc' dYfZca hY 7: 5z hYa U ja i a " _Y] \ccX'Yg]a U]cb'a YhcX'k Ug'WcgYb' lc' XMYa jbyhY dUfa Ymf'g'cZ hY XUU X]gf]m hcb" -b' dUfhW' Ufz' hY gh XmfY]YX' cb' fYg' lg' cZ hY W]! gei UY g'UghjW'g' UbX' Zh j bX]Wg' i gbl' ' hY fcecha Yub' g'UbxUfX' Yf'cf' cZ Udfcl ja U]cb' fFA G95 E'z Wa dUfUj Y Zh j bXY' f7: -Ez Hi WYf' @k jg] bXY' fH@-L'UbX'bcfa YX'Zh j bXM' fB: -Lc' Ugg'Ygg' hYa cXY' fB bXYf'gcb' / ; YfV]b] z % , , E' hYa cXY' XYa cbgfUHX' Ub' UWWdHUYa cXY' Zh' X' 1' ' ' ' * "S*) f] , (E/ 7: = 1' S' - +& H@= 1' S' -) , /B: = 1' S' - *) /UbX'FA G95 ' 1' "S) " =a dcfUbhnz hY g'UbxUfX]nYX'ZMcf' c'U]b] g'Y WYXX' hY hfYg' c'X'cZS) S'fk Uf' YhU' z&S%(L'UbX'k Ug'g] b]ZVbhU'S) Ug'g'ck b' j b' HUvY' "

HAYUggYgga YbhcZa Ylg' fYa Ybha cXY' cZ hY WffYbhgi XnWbgghX'cZ7 fcbVUW' g'5 d'Ufl E'z Wa dclh' fY]U]]mz Uj YfU Y j Uf]Uy' Y hfUWX' fB J 9E' UbX' hY : cfbY'!@UWYf' W]mf]cb" -b' dUfhW' Ufz' 7 fcbVUW' g'Ud' U'UbX'Wa dclh' fY]U]]mz YfYWW' UHX'lc' g'ck j bhmfbU' WbgghbWn Ua cb] ' hY Wbgfi Wg'k \fYUg' 5 J 9' k Ug' i gYX'lc' [U [YWbj Yf] Ybhj U]X]m' D]cf' gi Xmg' [[Ygh hUh j b' cfXY' lc' cVU]b' g'Ug'ZMcfmWbj Yf] Ybhj U]X]mz hY Yg]a UHX' dUfa Ymf'g' Vhk Yb' hY 'Uhbhj Uf]Uy'g' UbX' hY j bX]Wcf' g'g'ci 'X'VY' U' YUgh'S) S'fk Uf' YhU' z&S%(E' hY gh Xmi gYX' hY : cfbY'!@UWYf' W]mf]cb'lc' Yl Ua jbyX]g]Ma j bUbj U]X]m' : cf' hY gh Xmi c'VU]b' Ub' Yg]a UY' cZ hY fY]U]]mVUgYX'cb' hY j bhm' WffYU]cb' cZ hY cVg'fj YX' j bX]Wcf' j Uf]Uy'g' 7 fcbVUW' g'Ud' U' k Ug' i gYX'lc' Yj Ui UY' j bhmfbU' WbgghbWfY]U]]mz \] YWa dclh' fY]U]]mz Ug' i gYX'lc' Ugg'Ygg' hY j bhmfbU' fY]U]]mz Zh Yj Uf]Uy'g' j bW' X]b] ' hY X]ZfYbhc' hf' c'U]b] "

5g'g'ck b' j b' HUvY' zU' 7 fcbVUW' 5 d'U' WYZZVWb]g' UbX' Wa dclh' fY]U]]mz Ya cbgfUHX' j Ui Yg' Ucj Y hY hfYg' c'X' cZ S'+ f7F 12S'+*z 12S'++L' Ug' fYWa a YbXX' Vm< Uf' YhU' f8S%(E' : i fh' Yfa cfYz] b' ch' Yf'lc' cVU]b' U'WbZfa U]cb' cZ Wbj Yf] Ybhj U]X]m' hY 5 J 9' g'k fYfWa di hX' Ug' X]gd' UHX' j b' HUvY' "G] b]ZVbhnz hY 5 J 9' g'X'Ya cbgfUHX' j Ui Yg' Ucj Yh' YS) hfYg' c'X'fk Uf' YhU' " &S%(Lk jh' hY 5 J 9' cZYUW' cZ hY 'UhbhWbgfi Wg' \ [\ Yf' h' Ub' gei UYX' WffYU]cb' cZ hY 'Uhbh j Uf]Uy' " A cfYcj Yfz' YUW' Wbgfi Wg' UfYg' a cfYj Uf]Uy' k Jh' jlg' fYUHX' j bX]Wcf'g' h' Ub' k Jh' Ubn' ch' Yf' Wbgfi Wf'k Uf' YhU' " &S%(E' 5g' Yl d'Uj' bYX' YU']fz' hY : cfbY'!@UWYf' W]mf]cb' fl cfbY' / ' @UWYf' % , %L' k Ug' i gYX'lc' Yj Ui UY' X]g]Ma j bUbj U]X]m' ftc' g'ck hY Yl h'bh'lc' k \ JW' hY Wbgfi Wg' UfYX]g]bWZca 'YUW' ch' Yf' U'gYX'cb' Ya d]f]W' g'UbxUfX'g'" 5g'g'ck b' j b' HUvY' ('Yck z hY gei UY fcech' cZ hY 5 J 9' cZYUW' Wbgfi Wf'fj YUYX' Uj Ui Y h' U]g' [fYUf' h' Ub' jlg' \ [\ Ygh WffYU]cb' k Jh' Ubn' cZ h' Ych' Yf' Wbgfi Wg'"

HUvY' ('g'ck g' hY WffYU]cb' a Uf]] k Jh' hYa Ybz' g'UbxUfX' Xj U]cb' UbX' hY gei UY fcech' Z 5 J 9' " FYg' lg' fYj YUYX' h' U'HC9' fA 1' "+&Z G8 1S' , %L' X'Ya cbgfUHX' h' Y \ [\ Ygha Yub' j Ui Yg' k \] Y =CG' fA 1' "(&Z G8 1S' - ' L' X'Ya cbgfUHX' h' Y Ygha Yub' j Ui Yg' " H' Y gh Xmi Yj Ui UHX' h' Y g'fYb] h' cZ hY fYU]cb'g'] dg' Vhk Yb' hY Zj Yj Uf]Uy'g' i gbl' 'DYUf'gcb' dfcXi Wla ca Ybh' WffYU]cb' WYZZVWb] " FYg' lg' fYj YUYX' h' U' 9B; ']g' g'fcb] 'mUgg' VUHX' k Jh' -BF' f7 = 0.73, p < 0.01 E'z -CG' f7 = 0.60, p < 0.01 L'UbX' 9BJ' f7 = 0.59, p < 0.01 E' 'G]a]Uf' nzh' YfYg' lg' X'Ya cbgfUHX' h' U'HC9']g' g'fcb] 'm

HUVY'

7cbZfa Ucfmi Umf'5bUngl'fYg`lg'Zf'gi XbhYb| U Yá Ybh

DUh'g'	GHbXfXnX ZMf'cUX b g'	GHbXfX Yf'cf''	-)1 WbZXBW bhYfj Ug''	R ² j Ui Yg	75 flL	7F'	5J 9'
9B; @%!!29B; .	S'+((.	S'S* &	⊗', **ZS'* &&Q	S') (.			
9B; @&!!29B; .	S', ((.	S'S) *	⊗'(-) (ZS'+ (Q	S'+%&			
9B; @ !!!29B; .	S'+ - .	S'S) , .	⊗' - %ZS'* ,) Q	S'*' , .			
9B; @(!!!29B; .	S'*+(.	S'S) *	⊗'+, (ZS') * (Q	S'() (.			
9B; D%!!29B; .	S'*() .	S'S*%	⊗Z* ZS') & Q	S'(%&			
9B; D&!!29B; .	S'+) .	S'S) , .	⊗' , * - ZS'*(%Q	S'+S'			
9B; D !!!29B; .	S'+* - .	S'S) .	⊗' , ++ZS'*%Q	S') - %			
9B; D(!!!29B; .	S'*+(.	S'S) , .	⊗'+, , ZS') * SQ	S'() (.			
79B; %!!29B; .	S'+ ' - .	S'S) .	⊗' , (+ZS'*% Q	S') (* .	S' - S' .	S' - %&	S') +* .
79B; &!!29B; .	S'+, .	S'S) *	⊗' , , , ZS'* , Q	S'*S)			
79B; ' !!!29B; .	S'+%&	S'S(- .	⊗' , S+ZS'*% Q	S') S*			
79B; (!!!29B; .	S'* * .	S'S) , .	⊗'+ S ZS') &&Q	S'(S(.			
C9B; %!!29B; .	S'+) * .	S'S) - .	⊗' , +&ZS'*(SQ	S'+&			
C9B; &!!29B; .	S', (.	S'S) (.	⊗'(-) (ZS'+ (&Q	S'+% .			
C9B; ' !!!29B; .	S'++(.	S'S) - .	⊗' , - SZS') , Q	S') - .			
C9B; (!!!29B; .	S', , + .	S'S) - .	⊗' - SZS'+%Q	S'+, + .			
=B CF%!!2=B F	S'+) + .	S'S*%	⊗' , ++ZS'*' +Q	S') +'			
=B CF &!!2=B F	S'+ %	S'S) + .	⊗' - S&ZS'*+ Q	S'* &			
=B CF' !!!2=B F	S'+ S'	S'S) *	⊗' , -- ZS'* , SQ	S'* &	S' - S' .	S' - %&	S'* S'
=B CF (!!!2=B F	S',) - .	S'S*%	⊗' - + ZS'* , SQ	S'+ , .			
=B CF) !!!2=B F	S', S&	S'S) *	⊗' - %ZS'* - &Q	S'*(' .			
=B CF*!!!2=B F	S', ' ' .	S'S*%	⊗'(-) ' ZS'+% Q	S'*(- (.			
=B CG%!!2=CG	S'+ (.	S'S* S'	⊗' ,) &ZS'*% Q	S') ' - .			
=B CG&!!2=CG	S'+ &	S'S) .	⊗' , -- ZS'* , (Q	S'* &			
=B CG !!!2=CG	S',) + .	S'S*%	⊗' - ++ZS'+ +Q	S'+ (.	S' - %&	S' - %&	S'* ,) .
=B CG (!!!2=CG	S', - , .	S'S*%	⊗' - , , ZS'+, Q	S', S*			
=B CG !!!2=CG	S', (+ .	S'S) , .	⊗' - *ZS'+ ' Q	S'+%&			
H9C9%!!2HC9	S', S) .	S'S) + .	⊗' - %ZS'* - ' Q	S'*(, .			
H9C9&!!2HC9	S'+ ' %	S'S) *	⊗' , (%ZS'* &Q	S') ' (.			
H9C9' !!!2HC9	S'* -) .	S'S) (.	⊗' , S%ZS') , - Q	S'(, ' .	S' , , &	S' - S'	S'* &&
H9C9 (!!!2HC9	S', - &	S'S* S'	⊗' - &ZS'+(Q	S'+ * .			
H9C9) !!!2HC9	S', S%	S'S* S'	⊗' - %ZS'* , ' Q	S'*(&			
9@9B %!!29B J	S'+&&	S'S) - .	⊗' , ' +ZS'* S) Q	S') &&			
9@9B &!!29B J	S', , , .	S'S) *	⊗' - , , ZS'+, Q	S'+, - .	S' , % .	S' , S) .	S') %&
9@9B ' !!!29B J	S', -) .	S'S) .	⊗' - &ZS'+, +Q	S', S%			
9@9B (!!!29B J	S',) %	S'S) , .	⊗' - * (ZS'+ +Q	S'+&			

Bch'f; ccXbYgg'cZhg'gUhg'W χ²(584) = 3336.065, p = 0.001; RMSEA = .05; CFI = 0.972, TLI = 0.958 and NFI = 0.965.
* p < 0.001. 75 !7fcbVUW g5 d\U7F !7ca dcglhFY|UM |hm5J 9! 5j YfU YJ Uf|UbW9l fUMX'

HUVY(.

7cffYU|cb'A Uf|l k |h\ A YbZGHbXfX8 Y |U|cb UbXGEFHcZ5J 9'

	A 95B .	GH8 9J .	GEFH8J 9E	9B; .	=BF .	=CG .	HC9 .	9BJ .
9B; .	' '*%&	S', - (.	S'+) - .	%SSS'				
=BF .	' ') , ' .	S'+ %	S', S*	" + & H .	%SSS'			
=CG .	' '(&&	S' - ' ' .	S', &	"* S(H .	') (+H .	%SSS'		
HC9 .	' '+&	S', %&	S'+, , .	') ((H .	"* +%H .	"(- SH .	%SSS'	
9BJ .	' '*%&	S', , (.	S'+%&	') ,) H .	"* ' ' H .	"(*' H .	"* (SH .	%SSS'

Bch'f7cffYU|cbgUFYg|b|ZVbhUih Yp < 0.01 ~Y Y''Hlp < 0.001/Hld O'S'S%Ap < 0.05''

UggVUHX`k jh`=BF`ft = 0.67žp < 0.01E"K \Uih`YfYg`lg`a Yb`jg`hUž`()i`fr² = 0.45EcZh`Y
j Uf]UbW]b`h`YdUfh]VdUbg`dYfWdh]cb`cZh`Yf`hWbc`c[mgYZYZZVMMWi`XVY`l d`U]bYX`Vmh`Yf`
dYfWdh]cb`cZh`Yei U]lmcZ]bgfi W]cbU`fYgci fWg`Uj`U]UVY`h`h`Ya`YgdWU`mXi`f]b[`h`Y7CJ`-8!
%`dYf]cX`"a`dcfh]bhnžU`h`YZj`Yj`Uf]UVYg`f9B;`ž`-BFž`-GGZHC9`UbX`9B`J`LXYa`cbgfUHX`dcd]hj`Y
g`U]hg]W`mg]`b]ZVbhfYU]cbg`]dg`Ug`g`ck`b`]b`HUVY`(""

"FYg`lg`

5` \]YFUW]W`fY]fYgg]cb`UbUng]g`k`Ug`dYfZ`fa`YX`h`c`Y`U`i`U`Y` \`ck`h`Y`Z`i`f!`dYX]W`f`j`Uf]UVYg`
f]BFž`-GGZHC9`UbX`9B`J`L`Y`d`U]b`gi`XYbhYb[`U`Ya`Ybh]b`h`Y`i`b]j`Yf]g]mgY]h]b[`Xi`f]b[`7CJ`-8`"H`Y`
j`Uf]UVYg`k`fYfYb]h]fYX`]b`Zj`Yg]Ydg`f]L`h`YX`Y`a`c[`f]U` \]W]Uf]UVYg`f]M]b]X]d]Yb]X]Ybhj`Uf]UVYg`-BFž`
-GGZHC9`UbX`9B`J`/`f]M]a`c]X]f]U]b[`j`Uf]UVY`!`HC9`/`f]M]e`-b]h]f]U]M]cb`YZZM]%!`9B`J`/`HC9`UbX`/`f]M]e`
]b]h]f]U]M]cb`YZZM]e`!`=BF`/`HC9`"

HUVY)`g`ck`g`h`Y`f`Y`g`lg`c`Z`h`Y` \]YFUW]W`fY]fYgg]cb`UbUng]g`"b`h`Y`Z`f`g`i`a`c`X`Y`ž`Z`i`f`W`b]f`c`
j`Uf]UVYg`k`fYfYb]h]fYX`"FYg`lg`fY`YUX`h`U`h`[`YbXY`f`f]l`!"(+)`ž`d`O`"SS%`L`UbX`h`m`d`Y`c`Z`X`Y`j`W`
f]l`1`"S`+ž`d`O`"S%`L`k`fY`g]`b]ZVb]h]m]f]YU]X`k`]h`9B;`"H`Y` \]YFUW]W`fY]fYgg]cb`UbUng]g`k`]h`
9B;`Ug`h`Y`W]h]f]cb]j`Uf]UVY]b`A`c`X`Y`%`f`Y`YUX`Ub`c]`YU`F`&`C`Z`S`S`%ž`f]ž`(&`L`1`-`&`&`d`1`S`SS%`
H`Y`fYg`lg`g`[`[`Yg]h`U`i`,`%š`c`Z`h`Y`j`Uf]UbW]b`9B;`]g`Y`l`d`U]b]YX`Vmh`Y`W`b]f`c`"j`Uf]UVYg`İ`
[`YbXY`UbX`h`m`d`Y`c`Z`X`Y`j`W`H`c`h`g]i`Z`f`<`%ž`<`&`UbX`<`ž`-BFž`9B`J`UbX`-GG`k`fYfYb]h]fYX`g]Y`d`k`]g`Y`
]b]h`c`A`c`X`Y`&`H`Y`g]Y`d`k`]g`Y`]b]W`g]cb`fYg`h`X`]b`U`g]b]ZVb]h]b]W]Y`a`Y`b]h`c`Z`F`&`("(&ž`
:`f]ž`(&`L`1`('`(",`ž`d`1`"SS%ž`h`fYfW]ž`]b]W]U]g]b[`h`Y`U`X`f`g]Y`F`&`V`m`i`("š`UbX`X`Y`a`cbgfU]b[`h`U`i`
(`&š`&`c`Z`h`Y`j`Uf]UbW]b`9B;`k`Ug`Y`l`d`U]b]YX`Vmh`-GGž`-BFž`UbX`9B`J`"b`Y`l`d`U]b]b[`h`Y`fYg`lg`
Z`f]h`Y`ž`-GG`f]l`1`S`")`*`&ž`d`O`"SS%ž`-BF`f]l`1`S`"%`-ž`d`O`"S%`L`UbX`9B`J`f]l`1`S`"%`-ž`d`O`"S%`L`U`X`U`
g]b]ZVb]h]UbX`dcd]hj`Y`ZZM]cb`9B;`"H`Y`a`c`X`Y`U`f`j`Uf]UVYž`HC9`k`Ug`Y`b]h]fYX`]b`A`c`X`Y`"H`Y`
U`X`X]h]cb`c`Z`HC9`fYg`h`X`]b`Ub`F`&`("ž`f]ž`(&`L`1`("S`",`*ž`d`1`"SS%`k`]h`U`W`f]fYg]cb]X]b[`a`Uf]b]U`
]b]W]U]g]Y`]b`F`&`V`m`i`%)`š`"H`Y`fYg`lg`Z`f]h`Y`f`fY`YUX`h`U`h`("š`UbX`c`Z`h`Y`j`Uf]UbW]b`9B;`k`Ug`
Y`l`d`U]b]YX`Vmh`Y`a`c`X`Y`U`f`j`Uf]UVY`HC9`]b`a`c`X`Y`"H`Y`Z`f`g]i`g]h`c`Z`]b]h]f]U]M]cb`h]f`a`9B`J`/`HC9`
k`Ug`Y`b]h]fYX`]b`A`c`X`Y`("H`Y`U`X`X]h]cb`c`Z`9B`J`/`HC9`fYg`h`X`]b`h`Y`F`&`("š`ž`f]ž`(&`L`1`"*)`&ž`
d`1`"SS%`H`Y`fYg`h`Z`f]h`Y`f`W`b]Z`fa`YX`n`d`c]h`Y`g]g`<`(`U`f]l`9B`J`HC9`1`"S`&ž`d`O`"S`)"E`H`Y`U`g]i`a`c`X`Y`
W`b]g]g]h`X`c`Z`h`Y`]b]h]f]U]M]cb`YZZM]g`c`Z`-BF`/`HC9`h`U`h`U`g`c`Y`l`d`U]b]g`n`d`c]h`Y`g]g`<`V`H`Y`]b]W`g]cb`c`Z`
h`Y`]b]h]f]U]M]cb`YZZM]!`=BF`/`HC9`n]Y`X`Y`h`Y`F`&`("(-ž`f]š`ž`(&`L`1`"'+)`ž`d`1`"SS%`H`Y`fYg`lg`
h`Y`fYz`c`f`Y`W`b]Z`fa`YX`n`d`c]h`Y`g]g`<`(`V`f]l`-BF]HC9`1`"%)`*ž`d`O`"S%`"

b`]b]Y`k`]h`h`Y`U`a`g`c`Z`h`Y`W`f]f]Y`b]h]g]i`X`m]U`b]X`]b`c`f`X`f`h`c`Y`l`d`U]b`h`Y`Y`l`h`b]h]c`k` \]W`.%`L`HC9`
a`c`X`Y`U`h]g`h`Y`f`Y`U`h]cb]g`]d`V`h]k`Y`b`h`Y`9B`J`UbX`9B;`/`UbX`&`L`HC9`a`c`X`Y`U`h]g`h`Y`f`Y`U`h]cb]g`]d`
V`h]k`Y`b`h`Y`-BF`UbX`9B;`]b]h]f]U]M]cb`d`c]g`Ug`d`fYg]b]h]X`]b`:]`i`fYg`&`UbX`"k`fYfY`W]YU]X`"b`
d`U]h]W`U`f`ž`h`Y`g]i`X`m]d`c]g]i`U`h]X`h`U`i`h`Y`g]f]Y`b[`h`c`Z`d`c]g]h]j`Y`f`Y`U`h]cb]g`]d`V`h]k`Y`b`U`E`C`b`]b]Y`
`Y`f]b]b[`Y`b]j`f`c`b`a`Y`b]h`U`b]X`V`L`-b]g]f]i`W]cbU`f`Y`g`c`i`f`W`g`UbX`g]i`X`Y`b]h]Y`b[`U`Ya`Y`b]h]g`[`f`Y`U`h]f`k` \]Y`b`
H`Y`W`b`c`c[`m`g`Y`Z`Y`Z`V`M`M`i`g` \] \]`D`f`Y`]c`i`g`g]i`X`m] \]U`g`g`c`k`b`h`U`i`h`Y`d`f`c`W`g`g`c`Z`Y`l`d`U]b]b[`h`Y`
]b]h]f]U]M]cb`h]f`a`]b`f]Y]fYgg]cb`UbUng]g]g]a`d`c`f]l`b]h]V`Y`M`g]Y]h]Y`U`X`g]h`c`U`V`Y`h]f`]b]h]f]d`f]Y`U]h]cb`c`Z`h`Y`
a`c`X`Y`U`h]cb`YZZM]b`U`a`c`X`Y`f]B`U`k`g`c`bž`&S`%`E`H`c`U`j`c]X`d`c]g]V`Y` \] \]`a`i`h]W`]b]Y`U]h]m]k`]h`h`Y`
]b]h]f]U]M]cb`h]f`a`ž`h`Y`j`Uf]UVYg`k`fYfYb]h]fYX`k` \]Y`h`Y`h`c`]b]h]f]U]M]cb`h]f`a`g`k`fYfY`W]U]h]X`f]b`_`Y`b`
/`K`Y`g]ž`%-`%`E`:]`i`fYg`&`UbX`"g`c`k`h`Y`]b]h]f]U]M]cb`d`c]g`Z`f`h`Y`k`c`]b]h]f]U]M]cb`h]f`a`g`"

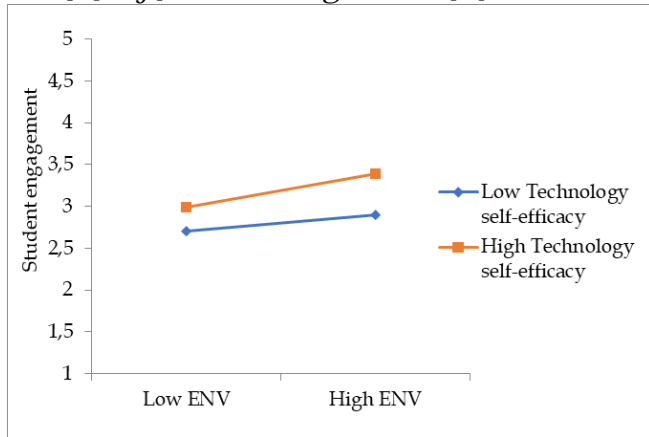
HUVY) .
 FYg l'g'cZai 'hd'YfYl fYg'gcb UbUng'gZ'f'g'i XbhhYb[U Ya Ybh

	A cXY' %			A cXY' (A cXY' .		
	Q9	B	Q9	Q9	B	Q9	Q9	B	J =
Control variables	S'Q' .	Q' (S)H	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
5 [YfR' !&+L	S'Q' +	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
; YbXf'fA UYL	S'Q' &	S'Q' (+) H	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
GWcc 'fC5 CHL	S'Q' %	S'Q' %	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
HndY'cZ8 Yj JWfA 'DL	S'Q' %&	S'Q' +H	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
Independent variables									
9BJ	S'Q' S'	S'Q' % - H	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
=BF	S'Q' S'	S'Q' % - H	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
=CG	S'Q' %	S'Q' %&H	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
Moderating variable									
HQ9	S'Q' S'	S'Q' % (H)	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
Interaction effects									
9BJ / HQ9	S'Q' S'	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
=BF / HQ9	S'Q' S'	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
F	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
F&	S'Q' %	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
ΔR2	S'Q' %&H	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .
ΔF	- "&)	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .	S'Q' .

BdY'hd'0'S'SS%hd'0'S'S%Ad'0'S'Q' / Q9" - Standard error; B - 6YhUJ = 'J UfUbw=bZUfcb: UMe'f/8 YdYb'XbhlJ UfUvY'9B:

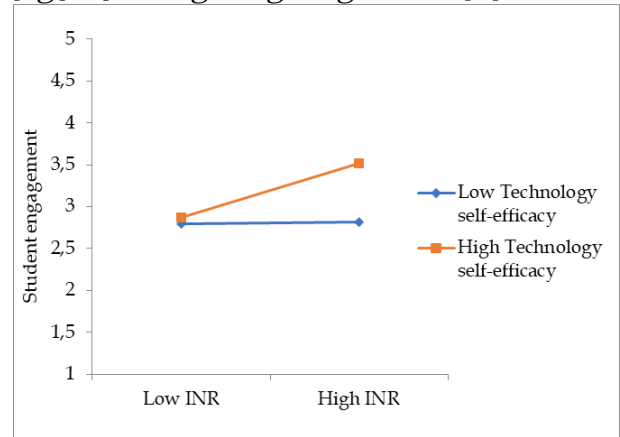
: || i fY&

HWbc`c[mgyZYZZWMMhUgUa cXfUrf Vfk Yb`cb`bY` Yfbb[`Ybj]fcb a YbhUbXgi XYbhYb[U Ya Ybh



: || i fY`

HWbc`c[mi gYZYZZWMMh Ug` U a cXfUrf` Vfk Yb`]bg]h hcbU`fygci fWg`UbXgi XYbhYb[U Ya Ybh



: || i fY&]g]bhfdfYhX`Ug`hWbc`c[mgyZYZZWMMhgfYb[h Ybg`h Ydcg]h] YfYU]cbg`]d` Vfk Yb` cb`bY` Yfbb[`Ybj]fcb a YbhUbX` gi XYbh Yb[U Ya Ybh` 5 g` Wb` VY` i bXYfg`rcX` Zca` : || i fY` z` hWbc`c[mi gYZYZZWMMhgfYb[h Ybg`h Ydcg]h] YfYU]cbg`]d` Vfk Yb`]bg]h hcbU`fygci fWg`UbX` gi XYbhYb[U Ya Ybh`

5 b`UbUng]g`cZ`h`Y`gla` d`Y`g`cd`Y`ZZ`W`g`ck` YX`U`dcg]h] Y`UbX`g] b]Z`W`b`h`f`Y`U]cbg`]d` Vfk Yb` HWbc`c[mi gYZYZZWMMhUbX` gi XYbh Yb[U Ya Ybh`k` \`b` h`Y`m`d`Y`W]j` Y`h`Y`ei` U]m`c`Z`h`Y`cb`bY` Yfbb[`Ybj]fcb a Ybh]f 9BJ1HC9` 1`"S) &Z`h`!`&` *` (z`d`O`"S) E`UbX`=bg]h] hcbU`fygci fWg`fl`_BF1HC9` 1`"%) *z` h`&*` &Z`d`O`"S)U`g`]` \`"5` W`cg`Y`c`V`g`f] U]cb`c`Z`h`Y`g`cd`Y`g`f`y] YU`h`U`h`Y`f`Y`U]cbg`]d` Vfk Yb` U`cb`bY` Yfbb[`Ybj]fcb a YbhUbX`gi XYbhYb[U Ya YbhUbX`/E`=bg]h] hcbU`fygci fWg`UbX`gi XYbh Yb[U Ya Ybh]g] fYUhf`k` \`Yb`gi XYbg`d`Y`W]j` YHWbc`c[mgyZYZZWMMhUg`]` \`"

("8]gWg]cb`

H`Y`Z`b`X]b[g`c`Z`h`Y`W`f`f`Y`b`h`g`i` X`m`g`ck` `h`U`ic`b`]bY` Yfbb[`Ybj]fcb a Yblz`]bg]h] hcbU`fygci fWg` UbX`]bg]h] hcbU`g` ddcf]h`g`h`Ya` g`Yb`UbW`gi XYbhYb[U Ya Ybh]b`h`Y`gi X`m`g`h]h]b[" `b`]bY`k`]h` h`Y`a` U`cf`U`a` `c`Z`h`Y`W`f`f`Y`b`h`g`i` X`n`z`h`Y`f`Y`g` `l`g`f`y] YU`Y`X`h`U`h`W`bc`c[mgyZYZZWMMhYb`UbW`h`Y` fYU]cbg`]d` Vfk Yb`cb`bY` Yfbb[`UbX`gi XYbhYb[U Ya Ybh`H`Y`g`Y`Z`b`X]b[g`U`Y`W`b`g`h]h`b`h`k`]h` d]cf`g`i` X]Y`g`h`U`h`g`ck` `h`Y`f`Y`g`U`X]f`W`f`Y`U]cbg`]d` Vfk Yb` \] \`Y` `Y]`Y`g`c`Z`W`a`d`i`h`f`g`Y`Z` YZ]WMMhUbX`gi XYbhYb[U Ya Ybh]f`U]fX` /` ?`i` \`z`&S) E`U`g`k`Y` `U`g`gi XYbg`i` g`Y`c`Z`h`W`bc`c[m`UbX` gi XYbh Yb[U Ya Ybh`f`U`g`]X` /` `5`g` \`U`z` &S`%`E`" `7`cbj`Y`f`g`Y`n`z`]Z`gi XYbg`X`c`b`c`h`i` \`U`Y` U`X`Y`e`i` U`h` _`b`c`k` `Y`X]`Y`c`Z`h`W`bc`c[m`U`d`d`]W`h`c`b`]b`h`Y`f` `Y`f`b]b[z`]h`W`i` `X`U`X]`Y`f`g`Y`m`U`Z`W`h`Y`f` `Y`b[U Ya Ybh` k`]h` `W`b`h`b`l`z` U`M`X`Y`a`]W`g`UbX`d`Y`f`g`" @]b`_]b[`h`Y`Z`b`X]b[g`c`Z`h`Y`W`f`f`Y`b`h`g`i` X`m`i`t`c` `h`Y`c`f`n`z` W`b`g]h] W]j`]g`a` `Y`l`d`U]b`g`gi XYbhYb[U Ya Ybh]b`h`Y`W`U`g`f`c`c`a` `c`f`a`]W`c`W`b`h`h`i`U`g`k`Y` `U`g`h`Y`]bg]h] hcbU` Ybj]fcb a Ybh`h`U`h`g`f]j`Y`t`d`f`c]]X`Y`gi XYbg`k`]h` f`Y`Y`U`b`h`_`b`c`k` `Y`X]`Y`U`b`X`g`]`g` f`P`U`i`z` &S`%`E`" H`]g`dcg]h]cb`d`f`c]]X`Y`g`W`Y`X`Y`b`W`Z`f`h`Y`X`Y`Y`c`d`a`Y`b`h`c`Z`U`Yfbb[`Ybj]fcb a Yblz`d`f`c]]g`c`b`c`Z`c`b`]bY`Yfbb[`fygci fWg`UbX`h`Y`Y`g`U`V`g`a`Y`bh]Z]bg]h] hcbU`g` ddcf]h`g`h`Ya`g`h`U`h`Y`b`UbW`cb`]bY`h`U`W]b[`UbX`Yfbb["H`]g`]g`U`g`c`W`b`g]h]h`b`h`k`]h` @CFYn!Djfy`Y`h`U`" f`R`S`%`E`k` \`c`g`ck` `h`U`h`Y`W`a`V]b`Y`X`Y`Z`W`c`Z`h`Y`j`U]c`i`g`h`W`bc`c[n`a`Y`X]U`Y`X`Yfbb[`U`M]j`]h`Y`g`U`g`U`dcg]h] Y`]b`Z`i`Y`b`W`c`b`h`Y`c`i`h`W`a`Y`g`c`Z`gi XYbh`Yfbb["

F`Y`g` `h`c`Z`h`Y`Z]f`g`i` n`d`c`h`Y`g`f`k` %E`h`Y`X`g`ck` YX`h`U`h`U`g`f`c`b[`cb`]bY` Yfbb[`Ybj]fcb a Ybh`Y`b`UbW`g`gi XYbh Yb[U Ya Ybh]b` \] \`Y` `Y]`X`i`W]h`c`b`g`h]h]b[" H`]g`]g`]b` U`f`Y`a`Y`b`h`k`]h` d]cf`g`W`c`U`f`m`g`i` X]Y`g`h`U`h`g`ck` `h`U`h`j`]h`i`U`@Yfbb[`9`bj]fcb a Ybh]f`c`f`Y`n`/` `F`c`g`Z`&S`%`E`UbX`d`Y`f`g`c`b`U` `c`f`U`X`U`d]h] Y`cb`]bY`Yfbb[`Ybj]fcb a Ybh]f`D`f`Y`a` `U`h`U`/` ;`Y`h`U`z`&S`%`E`Y`b`UbW`gi XYbhYb[U Ya Ybh` @Yfbb[`U`a`cb[`g`i`XYbg`]g`Y`b`UbW`X`]b`cb`]bY` Yfbb[`Ybj]fcb a Ybh`h`f`c`i` [\`W`b]h]M`h]cbz`d`U]h]W]U]h]cb`UbX`W`Y`g`c`b`U`a`cb[`g`i`XYbg`f`7`c`g`h`Y`m`/` @U]b[Y`z`&S`%`/` ;`f`U`U`a`z`&S`%`E`"5`g`c`z`Z]b`X]b[g`c`Z`h`Y`W`f`f`Y`b`h`g`i` X`m`g`ck` YX`h`U`h`Y`f`Y`g`U`dcg]h] Y`f`Y`U]cbg`]d` Vfk Yb`]bg]h] hcbU`fygci fWg`

UbX`gi XYbh Yb[U Ya Ybh`h FYZcfYz WbZfa]b[< &`H]g`fYg`h`g ddcfh]ZbX]b[g`Zca`dfY]ci`g`
 gi Xn k \jW`g`ck`h`U`h`gi XYbh Yb[U Ya Ybh]b`Ub`cb`]bY`Yfb]b[`Ybj]fcb`a Ybh]g`dcg]h] Ym
]bZi YbWV`mcb`]bY`Yfb]b[`fY`ci`fWg`h`U`fY]b]h`Ym`U`m`UbX`U`W`Y`a]W`m]h`a`i`U`h]b[`f]`i`dU
 /`D`UbX`Ynz`&S`%`E`"G]a`]`U`f`nz`7`Y`b`Y`h`U`"f`S`%`E`]b`X]W`Y`h`U`h`fY]g`U`dcg]h] YfYU]cbg`]d`V`k`Y`b`
]b]f`b`Y`h`UbX`k`Y`U`g`Y`Y`f`b]b[`h`W`bc`c[]Yg`UbX`gi XYbh Yb[U Ya Ybh`UbX`Yfb]b[`ci`h`W`a`Y`g`
 <`ck`Y`f`z`h`Y`ci`h`FYU`c`Z`7`C`J`-`8`!`%`f`y`Y`U`Y`X`h`Y`Z`U`h`Y`g`c`Z`Y`l`g]b[`g`fi`W`f`Y`g`UbX`f`Y`ci`f`W`g`
 Y`g`U`W`U`m]b`X`Y`Y`cd]b[`W`i`b]f]Y`g`g`W`U`g` ;` \`Ub]b`g`d`dcfh]b[`g`i`X`Y`b]g`k` \`c`"Y`fb`h`f`ci` [` \`cb`]b`Y`
 a`c`X`Y`g`"K` \`j`Y`df]cf`g`i`X`m` \`U`g`X`Y`a`cb`g`f`U`h`X`h`U`h`]b`U`X`Y`e`U`Y`U`w`cf`U`cf]Y`g`UbX`h`Y`U`W`c`Z`
 W`a`di`h`f`g`U`b`X`U`d`h`cd`g`U`b`X`c`h`Y`"Y`fb]b[`X`Y`]W`g`W`b]h]b`i`Y`t`U`Z`Z`W`i`cb`]bY`Y`fb]b[]b`X`Y`Y`cd]b[`
 W`i`b]f]Y`g`f`a`i`h`gn`U` /`A`U`c` \`U`z`&S`%`E`z`h`Y`F`Y]g`U`b`i`f`]b`h`b`Y`X`Z`cf`]b]h`f`Y`b]h]cb`g`U`h`h`Y`]bg]h`i`h`cb`U`
 Ub`X`b`U`h]cb`U`"Y`Y`g`t`c`Y`b` \`Ub`W`]h`g`i`d`U`Y`" "

5`b`Ub`U`ng]g`c`Z`h`Y`X`U`U`U`g`c`f`y`Y`U`Y`X`h`U`h`h`f`Y]g`U`dcg]h] YfYU]cbg`]d`V`k`Y`b`]bg]h`i`h`cb`U`
 g`d`dcfh`g`n]h`a`g`UbX`gi XYbh Yb[U Ya Ybh`H`]g`d`U`h]W`U`f`ci`h`W`a`Y`W`b`Z`fa`Y`X`<`" `UbX`]h`]g`
 W`b`g]g`h`k`]h`D`cf]h`f`"Y`h`U`"f`R`S`%`E`k` \`c`"g`ck`h`U`h`g`f`i`W`f`Y`z`g`f`U`h]m`UbX`g`d`dcfh`W`b`g]h`i`h`
 Y`g`g`Y`b]h]U`Z`W`i`f`g`Z`f`X`Y`Y`cd]b[`h`W`bc`c[`n]a`Y`X]U`h`X`"Y`fb]b[`Z`U`a`Y`k`cf`"]b`Y`X`i`W`h]cb`U`
]bg]h`i`h`cb`g`"b`g`h`i`U`h]cb`g`c`Z`i`bd`U`b`Y`X`X]g`i`d`h]cb`g`g`W`U`g`7`C`J`-`8`!`%`z`h`Y`g`k`]z`i]b]h`f`Y`b]h]cb`c`Z`h`Y`
 i`b]j`Y`f`g]h`m]r`X`Y`d`c`m]c`]bY`Y`fb]b[]c`a`]h]U`Y`d`c`g]V`Y`X]g`i`d`h]cb`g`t`c`"Y`fb]b[]g`j`Y`m]a`d`cf]h`b`h`
 t`c`g`g`U]b]b[]U`W`Y`a`]W`U`W`j`]h`Y`g`"H`Y`F`Y`Z`c`f`Y`z`]bg]h`i`h`cb`U`g`d`dcfh`g`n]h`a`g`h`U`h`]b`W`X`Y`h`W`b]W`
 UbX`d`Y`X`U`c[]W`"g`d`dcfh`U`g`k`Y`"U`g`]bg]h`i`h`cb`U`]b`W`b]h]j`Y`g`h`U`h`Y`b` \`Ub`W`h`Y`i`d`U`Y`c`Z`cb`]b`Y`
 Y`fb]b[`f`f`U`U`a`z`&S`%`E`]g`j`Y`m]a`d`cf]h`b`h`b`ck`UbX`U`Z`m`7`C`J`-`8`!`%"`7`cb`j`Y`f`g`Y`nz`U`U`W`c`Z`
 U`X`Y`e`i`U`Y`a`Ub`U`Y`a`Y`bh`g`d`dcfh]b`h`Y`U`d`]W`h]cb`c`Z`cb`]bY`Y`fb]b[`U`X`Y`f`g`Y`m]U`Z`Z`W`i`h`Y`X`Y`]j`Y`m]c`Z`
 cb`]bY`W`b`h]b`h`f`b`Z`Y`U`z`&S`%`E`UbX`gi XYbh Yb[U Ya Ybh`k`]h`W`b`h]b]z`U`W`Y`a`]W`g`UbX`d`Y`f`g`"
 7`cb`g`Y`e`i`Y`b`h`nz`k` \`Y`b`Y`X`i`W`h]cb`U`d`f`c`]X`Y`f`g`c`Z`Z`f`g`d`dcfh]t`c`g`i`X`Y`b]g`h`f`ci` [` \`h`Y`d`f`c`j`]g`cb`c`Z`-`H`
]b`Z`U`g]f`i`W`f`Y`U`b`X`]bg]h`i`h`cb`U`d`c`]W`g`h`U`h]d`f`ca`c`h`]b`b`c`j`U`h]Y`h`U`W`]b[]UbX`Y`fb]b[]f`f`U`U`a`z`
 &S`%` /`D`cf]h`f`"Y`h`U`"z`&S`%`E`z`g`i`X`Y`b]g`k`]"Y`Y`k`Y`d`f`Y`d`U`Y`X`t`c`Z`W`i`b`Z`c`f`Y`g`Y`b`U`W`Y`a`]W`k]g`i`d`h]cb`g`" "

H`Y`:]b`X]b[]g`c`Z`h`Y`W`f`f`Y`b`h`i`g`i`X`m]Z`i`b`X`g`d`dcfh]Z`f`<` (U`UbX`<` (V`"]f`g]z`]b`f`Y`U`h]cb`t`c`<` (U`z`h`Y`
 g`i`X`m]f`Y`Y`U`Y`X`h`U`z`h`W`bc`c[]m`g`Y`Z`Y`Z`Z`W`m]h`g`f`Y`b[]h`Y`b`g`h`Y`d`c]g]h] YfYU]cbg`]d`V`k`Y`b`cb`]b`Y`
 Y`fb]b[`Y`bj]f`cb`a`Y`bh`UbX`gi XYbh Yb[U Ya Ybh`D`U`h]W`U`f`nz`g`i`X`Y`b]g`"Y`l`d`Y`]Y`b`W`W`b`W`f`b]b[`
]b`W`U`g`X`U`h`cb`ca`nz`W`"U`w`cf`U`h]cb`UbX`W`U`h]j`]m`f`h`Y`g`cb`"Y`h`U`z`&S`%`E`]b`h`Y`cb`]b`Y`Y`fb]b[`
 Y`bj]f`cb`a`Y`bh]g`d`U`h]m`X`Y`d`Y`b`X`Y`b`h`cb`h`W`bc`c[]m`g`Y`Z`Y`Z`Z`W`m]h`H`Y`F`Y`Z`c`f`Y`z`h`f`ci` [` \`g`i`X`Y`b`h]f`U`]b[]z`
 cb`]b`Y`g`d`dcfh]z`Y`Y`m]cb]W`W`a`a`i`b]W`h]cb`UbX`h`Y`d`f`c`j`]g`cb`c`Z`]b]h]f`b`Y`h`U`W`g`]b`h`Y`Y`fb]b[`
 Y`bj]f`cb`a`Y`bh]f`c`f`Y`m] /`F`c`g]z`&S`%`E`z`g`i`X`Y`b]g`U`W`j`Y`m]Y`b[]U`Y`k`]h`h`Y`f`h`U`W`Y`f`g]d`Y`f`g`Ub`X`W`b`h]b]h`" "

G`Y`W`b`X`z`]b`f`Y`U`h]cb`t`c`<` (V`h`Y`Z`b`X]b[]g`g`ck`h`U`h`h`W`bc`c[]m`g`Y`Z`Y`Z`Z`W`m]h`g`f`Y`b[]h`Y`b`g`h`Y`
 d`c]g]h] YfYU]cbg`]d`V`k`Y`b`]bg]f`i`W`h]cb`U`f`Y`ci`f`W`g`UbX`gi XYbh Yb[U Ya Ybh`K` \`U`h`h`Y`g`Y`f`Y`g`]g`
 g`ck`]g`h`U`h`h`W`bc`c[]m`g`Y`Z`Y`Z`Z`W`m]h`g`]a`d`cf]h`b]h]t`c`Y`b` \`Ub`W`b[]g`i`X`Y`bh`Y`b[]U`Y`a`Y`bh`]b`U`b`cb`]b`Y`
 Y`fb]b[`Y`bj]f`cb`a`Y`bh`Ub`X`h`]g`k`U`g`Y`j`X`Y`b`h`X`i`f`]b[]h`Y`Y`U`f`m]g]U`Y`g`c`Z`7`C`J`-`8`!`%`d`U`b`X`Y`a`]W`k` \`Y`F`
 g`i`X`Y`b]g`k`f`Y`c`V`]Y`X`t`c`U`h`Y`h`Y`f`"W`m]f`Y`g`j`]U`cb`]b`Y`Y`fb]b[]a`c`X`Y`g`"H`Y`X`]a`Y`b`g]cb`g`c`Z`
 h`W`bc`c[]m`g`Y`Z`Y`Z`Z`W`m]h`W`b`g]g`i`c`Z`h`Y`g`f`Y`b[]h`z` []Y`b`Y`U`]g`U`]m]i`UbX`a`U`]b]i`X`Y`f`7`ca`d`Y`U` /`
 <`] []]b`g]z`%`-`)`E`h`U`h`U`F`Y`b`Y`W`g`U`f`m]Z`f`g`i`X`Y`bh`Y`b[]U`Y`a`Y`bh`]b`U`h`W`bc`c[]n]a`Y`X]U`h`X`"Y`fb]b[`
 Y`bj]f`cb`a`Y`bh`<`ck`Y`j`Y`f`z`h`W`bc`c[]m]d`f`c`Z`W`b`W`h]g`b`c`h]h`Y`g`U`a`Y`]b`U`"W`i`b]f]Y`g`W`m]g`Y`h`W`bc`c[]m`
 U`Z`c`f`X`U`b`W`g`U`F`Y`U`g`Y`X`cb`X`]Z`Z`Y`b`h`g`l`i`U`h]cb`g`"b`"g`ca`Y`W`e`y`g`z`g`i`X`Y`b]g`cb`m` []Y`h`U`W`g`t`c`i`g`Y`
 W`a`di`h`f`g`k` \`Y`b`h`Y`m]j`]g`h`W`a`di`h`f`"U`w`cf`U`cf]Y`g`]b`]bg]h`i`h`cb`g`":`cf`]bg]U`b`W`z`U`g`i`X`m]V`m]A`i`h`gn`U`
 Ub`X`A`U`c` \`U`f`R`S`%`E`f`Y`Y`U`Y`X`h`U`h`*`+`c`Z`g`i`X`Y`b]g`]b`di`V`]W`b]j`Y`f`g]h]Y`g`]b`?`Y`b`n]U`k`Y`F`Y`W`a`di`h`f`
]h`f`U`h]g`k`]h`U` []f`Y`U`f`"d`Y`f`W`b]h]U`Y`]b`X]W`h]b[]h`U`h`h`Y`m]U`W`i`]f`Y`X`_`b`ck`Y`X]Y`c`Z`W`a`di`h`f`
 U`d`]W`h]cb`k` \`Y`b`h`Y`m]k`f`Y`]b`g`Y`W`b`X`U`f`m]g`W`cc`"b`" ;` \`Ub`z`f`Y`W`b]h]f`Y`g`U`F`W`V`m]5`X`U`f`_`k`U`f`R`S`%`E`
 f`y`Y`U`Y`X`h`U`h`U`W`c`Z`U`W`g`t`c`]b]h]f`b`Y`h`UbX`Y`Y`W`]W`m]U`Y`g`ca`Y`c`Z`h`Y`W`U`Y`b[]Y`g`t`c`h`Y`i`d`U`Y`c`Z`
 cb`]b`Y`Y`fb]b[" "

7`cb`W`f`b]b[]h`Y`W`b]f`c`"j`U`f`]U`V`Y`g`z`h`Y`f`Y`g`h`f`Y`Y`U`Y`X`h`U`h`h`Y`h`m]d`Y`c`Z`X`Y`]W`f`a`c`V`]Y`D` \`cb`Y`:
 i`g`X`V`m]g]i`X`Y`b]g`]b`cb`]b`Y`Y`fb]b[`Y`bj]f`cb`a`Y`b]g` \`U`g`U`d`c]g]h] Y`Ub`X`g`l`]b]Z`W`b]h]Y`Z`Z`W`i`cb`g`i`X`Y`b`h`
 Y`b[]U`Y`a`Y`bh`H`]g`Z`b`X]b[]g`g`l`]b]Z`W`b]h]t`c`h`W`bc`c[]n]i`g`U`Y`]b` \`] [\`Y`f`Y`X`i`W`h]cb`V`W`m]g`Y`]h]f`Y`Y`U`g`z`
 %` \`ck` "Y`fb]b[`X`Y`]W`g`Y`g]f`Y`U`g`t`c`g`h`U`h`Y`b` \`Ub`W`g`i`X`Y`bh`Y`fb]b[]Ub`X`Y`b[]U`Y`a`Y`bh`Ub`X`z`&` \`ck` "

< 9-g Wi 'X' df|cf|]hny h Y 'Yufb|b| ' Xy] JWg i gYX' Vmi ghi XYblg']b' cb']bY 'Yufb|b| ' hc' Yb\Ubw Yb| U Ya Ybh' Dfy]]ci g' ghi XmVmiK Ub| ' YhU' f8% Eg' ck YX' h UihWbc' c| mgYf] Yg' Ug' Ub']b|b| fU' dUfhcZHMUW|b| ' UbX' 'Yufb|b| ' dfcWggYg' UbX' ghi XYbhYb| U Ya Ybh|b' \] \ Yf' Yxi W]cb' " 5' gcž h Y fYg' 'lg' XYa cbgfUHX' h Uih [YbXYf' fZa UY: \ Ug' bY| U]j Y Vi hi g| b]ZVbhi YZYM' cb' ghi XYbh Yb| U Ya Ybh' < ck Yj Yfž U Y f8! &+L UbX' gWcc' fG5 GHGž XYa cbgfUHX']bg| b]ZVbhi YZYM' cb' ghi XYbhYb| U Ya Ybh' "

("%9Xi W]cbU' =a d']W]cbg'

K \]Y < 9-g VM]]b' hc' h]b_ ' UbX' d' Ub' hck UFXg' d' cgh7CJ =8!% ' UbX' h YWU]cb' cZfcVi ghgfi W' fYg' UbX' gnhYa gh' h' Uk]' k]h g' UbX' d' cgg] VYZ' hi fYX]gfi dh]cbgž] h \ Ug' VWa Y]a d' cf]h' b]Zf' a UbU' Yf' g' cZ < 9-g' hc' di h]b' d' UW' dc']W]g' UbX' dfUM]Wg' h' Uk]' UXX' fYgg' h' Y]a a YX]U' Y' cb']bY' 'Yufb|b| ' bYX' g' cZ' ghi XYblg' UbX' Yb\Ubw' ghi XYbh Yb| U Ya Ybh' ' H']g']bW' X' Yg' d' 'Ubb|b| ' Zf' h' Y' d' fcj]g|cb' cZ \ UFXk UfYž' g' Zk UfY' UbX']b]h' f' b' Yh' WbbY]cb' f5' a U]U' ' Yh' U' ž &888L h' Uih k]' ' Ybg' fY' U' ga' cch']a d' Ya Yb]h']cb' cZcb']bY' 'Yufb|b| " -b; \ Ub' U' WU' ' Yb| Yg' g' W' Ug']b' U' X' Yei UY' k]fY' Ygg' h' Wbc' c|]Ygž ' ck]g' d' YX']b]h' f' b' Yh' U' b' Xk]Xh' g' UbX' d' ccf' b' Yk' cf_ ' g' W' f]]mi' Wbb]bi Y' hc' UZZM' ei U]]mi' cb']bY' h' UW|b| ' UbX' 'Yufb|b| ' XY]j Yfmi' f' UfV]]5 dU' ' Yh' U' ž &888L " : cf' ghi XYblg']b' h' Y' Yb|]bYf]b| ž Udd']X' g']Wb' Wgž' UbX' \ YU' h' ' g']Wb' W' X]g' Vd']b' Ygž' h' YfY']g' h' Y' bYX' Zf' a' cfY']bj' Yga' Ybh']b' j]fhi U' ' U' cf' U' cf]]Yg' h' Uih k]' ' Ybg' fY' h' Uih' ghi XYblg' \ Uj Y i b \]b' X' YfYX' U' W' g' hc' h' UW|b| ' UbX' 'Yufb|b| " DUF]W' U' f' nž' h' Wb]W']W' I' b]j Yfgh]Yg']b; \ Ub' U' Wi' ' X' W]]b' hc' ' Yl' d' cfY' d' Uf]h' Yf' g']dg' k]h' ' gca' Y' c' W' UbX']b]h' f' b' U]cb' U' i' b]j Yfgh]Yg' hc' g' UfYfYgci fWg] ' Ygd' W]U' ' mj]fhi U' ' U' cf' U' cf]]Yg' ' G' W' d' Uf]h' Yf' g']dg' k]' ' U' g' ' Ybg' fY' h' Uih' ' YMi' fYg' UfY' d' fcj]X' X' k]h' ' h' Y' bYX' YX' fYgci fWg' hc' g' d' d' cf]h' h' Y' _ bck' ' YX] Y' UbX' g']' g' Xy] Y' cda' YbhcZ' ghi XYblg' k \] Y' ghi XYblg' UfY' U' g' ' Yl' d' cg' X' hc' U' X] UbW' 'Yufb|b| ' fYgci fWg' h' Uia' U' mbch' VYfYU' X] m] Uj U' VY']b' h' Yf' 'Yufb|b| ' Ybj]f' cba' Ybh' "

G' W' b' X' ž' cb' Y' cZ' h' Y' WU' ' Yb| Yg' h' Ya' U' cf]]m' cZ']bg]]h']cb' g' Z' W' X' X' i' f]b| ' h' Y']b]]U' ' g' U' Yg' cZ' h' Y' 7CJ =8!% ' d' UbX' Ya']Wk' Ug' h' Y' ' U' W' ' cZ' dc']W]g' h' Uih' UXX' fYgg']bg]]h']cb' U' ' Uf]b| Ya' Ybh' Zf' f' Ya' ch' Y' h' UW|b| ' UbX' 'Yufb|b| " 5' X]]h' cb' U' nž' gca' Yi' b]j Yfgh]Yg' \ U' X' bc' dc']W]g' cb' cb']bY' Yl' Ua']b' U]cb' g' UbX' fi' Yg']c] Yf]b|b| ' h' Yi' g' Y' cZcb']bY' 'Yufb|b| ' fYgci fWg' " 7' Yf]U]b' nž' < 9-g' UfY' bck' ' Z' W' X' k]h' U']fYU' h' WU' ' Yb| Y' h' U' b' ' Yj' Yf' ' hc' ' Ybg' fY' h' Uih' bch' cb' m' UfY' g' fi' W' fYg' UbX' gnhYa' g' di h]b' d' UW' hc' g' d' d' cf]h' cb']bY' 'Yufb|b| ' Vi' h' a' cfY']a' d' cf]h' b' h' nž' h' Uih' dc']W]g' h' Uih']i']X' Y' cb']bY' 'Yufb|b| ' UfY' di h]b' d' UW' " 5' bch' Yf']h' a' ' k' cf]h' ' a' Yb]cb|b| ']g' h' Y' bYX' Zf' h' UW|b| ']bb' c] U]cb' h' Uih' UXX' fYgg' Yg' Ya' Yf]]b| ' 'Yufb|b| ' bYX' g' cZ' ghi XYblg']b' W' X]b| ' a' cb]]cf]b| ' ghi XYblg' ' U' M]j Y' d' Uf]h' W' d' U]cb']b' h' Y' cb']bY' 'Yufb|b| ' Ybj]f' cba' Ybh' =b' cf' X' f' hc' ' Yb' \ UbW' ghi XYbhYb| U Ya Yblž' A']b]m' f8888L Uf] i' Yg' h' Uih' Yi' g' Y' cZ' X]g' Vc' UfX' g' k]' ' d' fcj]X' Y']bg] fi' W' f' g' k]h']b' Z' fa' U]cb' cb' h' Y' h' a' Y' ghi XYblg' g' d' YbX' cb' h' Y' Wi' f' g' Y' k' Y' g]h' gž']X' Yb]]Z' m' UbX' fYg' d' cb' X' hc' h' Yf' WU' ' Yb| Ygž' UbX' W' Uf]h' ghi XYblg' d' fc]]fYgg' ' H' Y]a' d' cf]h' UbW' cZ' X]g' Vc' UfX' g' hc' ghi XYblg']g' h' U' ž]h' g' Yf] Yg' hc' d' fca' dh' h' Ya' ' cZ' h' Yf' ' h' U' g' UbX' ' Yl' d' Y' W' X' ci' h' di' h' g']b' U' []j Yb' d' Yf] cX' " H' YfY' Zf' Y' h' Y' d' fcj]g|cb' cZ' X]g' Vc' UfX' g']b' h' Y' cb']bY' 'Yufb|b| ' Ybj]f' cba' Ybhk]' ' YU' X' hc' ei U]]m' Yb| U Ya Ybh' W' h' Yb' ghi XYblg' UbX' h' U' W' Yf' g']b' h' Y' cb']bY' 'Yufb|b| ' Ybj]f' cba' Ybh' "

H']fXž < 9-g' a' i' ghid]cf|]hny h' U]b|b| ' Zf' U' W' X' Ya']W]g' UbX' ghi XYblg']b' h' Yi' g' Y' cZcb']bY' 'Yufb|b| ' h' W' bc' c|]Yg' hc' ' Yb' U' VY' h' Ya' ' hc' ' W' d' Y' k]h' ' h' Y' Yl' d' Y' W' X' 'Yufb|b| ' ci' h' Wa' Yg' cZ' h' Y' X]j Yf' g' Y' Wi' f' g' Y' g']b' W' X]b| ' h' cg' Y' h' U' h' Y' f' ei]fY' j]fhi U' ' U' cf' U' cf]]Yg' " Dfy]]ci' g' ghi Xm' \ Ug' fY' YU' X' h' Uih']bg] fi' W']cb' U' h' W' bc' c|]Yg' UfY' a' U' W' YX' k]h' ' W' ff' Yg' d' cb' X]b| ' X]j Yf' g' Y' d' YXU' c]]W' ' U' d' d' cf' U' W' Yg' h' Uih' f' Y' ei]fY' ghi XYblg' hc' 'Yufb']b' h' Ua' gž' Yb| U Yk]h' ' YU' W' ch' Yfž' UbX' Yb| U Yk]h' ' h' Y']bg] fi' W' cf' fA']b]m' ž &888L UbX' W' b]h' b]h' ' H']g' U' g' ' a' Y' bg' h' Uih']bg] fi' W' f' g' k]' ' \ Uj Y' hc' ' Xy] Y' cd']bb' c] U]j Y' d' YXU' c]]W' ' U' d' d' cf' U' W' Yg' h' Uih' Yb' \ UbW' ghi XYbhYb| U Ya Ybh|b' h' Y' cb']bY' 'Yufb|b| ' Ybj]f' cba' Ybh' "

@U]h' nž' h' W' bc' c| mg' Y' Z' YZ' W' W' i' Ua' cb| ' ghi XYblg']g' Yg' Yb]U' ' hc' ' Yb' \ UbW']b| ' cb']bY' h' UW|b| ' UbX' 'Yufb|b| " K \] Ya' cgh']h' f' Uih' fY' Ya' d' U]h' n' h' Y' cb']bY' 'Yufb|b| ' Ybj]f' cba' Yblž']bg] fi' W']cb' U' fYgci fWg' UbX']bg]]h']cb' U' g' d' d' cf]h' g' h' a' gž' h' Y' W' ff' Yb]h' ghi Xm' \ Ug' fY' YU' X' h' Y' W' b]f' U']m' cZ' h' W' bc' c| mg' Y' Z' YZ' W' W' i']b' Yb' \ UbW']b| ' ghi XYbhYb| U Ya Ybh|b' < 9-g' Ygd' W]U' m]b; \ Ub' U' I' b' Xci' Vh' X' nž' h' Y' 7CJ =8! % ' d' UbX' Ya']W' g' Yf] YX' Ug' U' gd' U' W' Zf' h' Y' X' Yd' cna' Ybh' cZ' Z' \ !g' W' Y' cb']bY' 'Yufb|b| ' Zf' ghi XYblg' " 5' h' ci' [\ ' a' UbU' Ya' YbhcZ' h' Y' W' ff' Yb]h' ghi Xm' W' b]h' h' di' h]b' d' UW' a' YU' g' fYg' hc' g' d' d' cf]h' ghi XYblg']b' h' Y' YU' f' mg' U' Yg' cZ' h' Y' d' UbX' Ya']W']cb' Y' cZ' h' Ya' U' cf' WU' ' Yb| Yg' h' Y']bg]]h']cb' Z' W' X' k' Ug' h' Y' Z' W' h' Uih' "

a Ubnigi XYblg XjX' bch\ Uj YWa di hf'g'cf' ga Uhd\cbYg" H Y XUU fyj YUYX' h Uih Ya Ucf] hmcZ
gi XYblg' k \c' dUfh] WdUHX']b' h Y gi Xmi f*1 E \UX' lc' fYmicb' h Yf' a cV] Y d\cbYg' lc' UWWgg' h Y
cb] bY' YUfb] b] ' d' UZcfa g' H YWU' Yb[Yk]h' h']g' gli Uqcb']g' h Ughi XYblg' k]' ' bchVYUYhc' i gY
h Yf' a cV] Y d\cbYg' lc' HU' Y cb] bY Yl Ua]bUqcbg' k \Yb' h Y i blj YfglmiUXcdlg' UZ' ' !gWY cb] bY
' YUfb] b] ' gng' Ya "K \] Ygca YcZ' h Yi blj Yfgl] Yg']bW X] b] ' h YWffYbhgi XmiWbhl hfYgcfhX' lc' h Y
i gY' cZ' gcWU' bYk cf_ g' g' W' Ug' Ncca' UbX' K \Ug' 5dd' Xi f] b] ' h Y 7CJ -8!% ' dUbxYa]W' h Y
' ja]hUqcbg' cZ' h Yg' Y' hc' g' VYWa Y UddUFYbh YgdYMU' m' VYMi gY' h Y hMUWfg' Wi' X' bch WbXi W
Yl Ua]bUqcbg' UbX' [fUXY' gi XYblg' cb] bY' : cf']bgUbwZ' @fV] !5dU' f8S8S' Uf[i Yg' h Uih h Y
WU' Yb[Yg']b' i gbl' ' gcWU' bYk cf_ g']b' hUW] b] ' UbX' ' YUfb] b] ']bW XY' ja]hX' Wi fgY' Wbhlbhi
a UbU Ya Yblzj i ' bYU]]hmcZ' h Yhc' g' UbXz' UW' cZ' g' cfU Ygng' Ya g' H YFY] g' h YfZ' fY' h YbYX' Z' f'
fYgi fW' g' ddcfhZ' f' h Y gi XYblg' UbX' UXX] hcbU' hfU] b] b] ' lc' YbUY' h Ya' i gY' h Y cb] bY' YUfb] b] '
a cXYcZXY' j Ymi'

("&'@ja]hUqcbgUbX: i li fYfYgUFW'

H Y ZbX] b] g' cZ' h YWffYbhgi Xmi g' ci' X' WY']bhfdfYHX']b' fYUqcb' lc' ' h' c' a U] b] ' ja]hUqcbg' :]fgh
XUUX' Z' f' gi XYblg' cb] bY Yl dYf] YbWg' Xi f] b] ' h Y 7CJ -8!% ' dUbxYa]W' Ug' U' h YfYX' U' h U] ja Yk \ Yb'
h Y i blj Yfglmi \UX' hfUbg] hcbYX' lc' h Y VYbXX' ' YUfb] b] ' a cXY' H]g' a Yubg' h Ughi XYblg' \UX' lc'
fYZW' mcb' h Yf' Yl dYf] YbWg' Xi f] b] ' h Y dYU' cZ' h Y 7CJ -8!% ' dUbxYa]W' c' VYUY' hc' dfcj]XY' h Yf'
fYgdcbgYg' H Y XW] g' cb' cZ' h Y fYgUFWYfg' lc' [U' h Yf' XUU' cb' cb] bY' YUfb] b] ' Xi f] b] ' U' ZUW' hc' ZUW
gYg] cb' k Ug' Xi Ylc' j Ymi' c' k' fYgdcbgYfU' Y' Ua cb] ' gi XYblg']b' cb] bY' g' fj Yng' " G' WbXz' h Y gi Xmi
k Ug' WbXi W' X' Ua cb] ' U' ga U' " g' Ua d' Y cZ' gi XYblg']b' cb' mcbY' H Wb] W' I blj Yfglmi]b' ; \UbU'
H YfZ' fYz' Z' li fY' fYgUFW' Wi' X']bW' M' U' g' h Y fU] Y cZ' gi XYblg' UbX' H Wb] W' I blj Yfgl] Yg' h Uih
UXcdhX' cb] bY' hUW] b] ' UbX' ' YUfb] b] ' lc' Yb' \UbW' h Y [Yb' YU] gU]]hmcZ' h Y gi Xmi U' c' gg' H Wb] W'
I blj Yfgl] Yg' " H]fX' nzk Y' ja]hX' ci' f']bX' d' YbX' Ybhj Uf] U' V' Yg' lc' ' cb' mih' fY' h YfZ' fYz' k Y Yl W' X' X'
ch' Yf' j Uf] U' V' Yg' h Uih U' m' VY' ja dcfhU' bh' : i li fY' fYgUFW' Wi' X' Yl d' cfY' h Y fYUqcbg' \d' V' k' Yb'
gi XYbhYb] U Ya YbhU' bX' ch' Yf' j Uf] U' V' Yg' g' W' Ug' gi XYbh' hUW' Yfz' gi XYbh' d' Yf' UbX' gi XYbh' Wbhlbhi
]bhfU' M']cb' "

) "7cbW gcb' "

H]g' gi Xmi Yl Ua]bYX' h Y dYfWd] hcbg' cZ' gi XYblg' U' c' i hcb']bY' YUfb] b] ' Ybj]fcb' a Yblz']bgfi W' mcbU'
fYgi fWg']bg] h] hcbU' g' ddcfhng' Ya g' Xi f] b] ' h Y 7CJ -8!% ' dUbxYa]W' UbX' gi XYbhYb] U Ya Ybh
]b' U' H Wb] W' I blj Yfglmi]b' ; \UbU' G' WbX' nzk Y Yl Ua]bYX' h Ya cXYfU] b] ' YZZW' mcbZ' h Wbc' c[m
gY' ZYZZW' mcb. %E' h YUgg' W' Uqcb' V' k' Yb' cb] bY' YUfb] b] ' Ybj]fcb' a YbhU' bX' gi XYbhYb] U Ya Ybh
UbX' & E' h YUgg' W' Uqcb' V' k' Yb']bgfi W' mcbU' fYgi fWg' UbX' gi XYbhYb] U Ya Ybh] b' h Y i blj Yfglmi
Xi f] b] ' 7CJ -8!% " :]fgz' ci' f' fYg' ' lg' fY' YUYX' h Uih cb] bY' YUfb] b] ' Ybj]fcb' a Yblz']bgfi W' mcbU'
fYgi fWg' UbX']bg] h] hcbU' g' ddcfhng' Ya g' Yb' \UbW' gi XYbhYb] U Ya Ybh] b' h Y gi Xmi g' h] b] " Ci' f'
ZbX] b] g' UfY' dUfh] W' U' m] a dcfhU' bh' V' M' gY']hdfcj]XY' fY' Y' U' bh] bZ' cfa Uqcb' cb' \ck' ' a UbU' Yfg' cZ'
< 9-g' Wi' X' di h] b' d' UW' g' fi W' fYg' UbX' dc']W' g' h Uih UXX' fYgg' h Y cb] bY' YUfb] b] ' bYX' g' cZ' gi XYblg'
UbX' Yb' UbW' gi XYbhYb] U Ya Ybh YgdYMU' m' Xi f] b] ' i bd' UbbyX' X] g' fi dh] cbg' g' W' Ug' 7CJ -8!% "
G' WbX' nzk' h Y WffYbh' gi Xmi fYj YUYX' h Uih h Wbc' c[m' gY' ZYZZW' m' %E' g' fYb] h Ybg' h Y d' cgl] j Y
fYUqcbg' \d' V' k' Yb' cb] bY' YUfb] b] ' Ybj]fcb' a YbhU' bX' gi XYbhYb] U Ya YbhU' bX' & E' g' fYb] h Ybg' h Y
d' cgl] j Y fYUqcbg' \d' V' k' Yb' ' -bg' fi W' mcbU' fYgi fWg' UbX' Gi XYbhYb] U Ya Ybl' H YfZ' fYz' V' mi
Ya d\ Uq] gbl' ' h Y ja dcfhU' bW' cZ' cb] bY' YUfb] b] ' UbX' g' W' U' Yl dYf] YbWg']b' h Y _ bck' YX' [YUbX' g']' g'
Xy' Ycda Ybh' cZ' gi XYblg' V' mik U' nicZ' h Wbc' c[m' gY' ZYZZW' m' k' Y Yl d' U] b' \ck' ' gcWU' W' [bl] j Y
h Ycfmi]g']b_ YX' lc' Yb] U Ya Ybl' H Y ci' h W' a Yg' cZ' h Y WffYbh' gi Xmi UfY' dUfh] W' U' m] a dcfhU' bh'
V' M' gY' h Y mdfcj]XY' fY' Y' U' bh] bZ' cfa Uqcb' cb' \ck' ' a UbU' Yfg' cZ' < 9-g' Wi' X' di h] b' d' UW' g' fi W' fYg'
UbX' dc']W' g' h Uih UXX' fYgg' h Y cb] bY' YUfb] b] ' bYX' g' cZ' gi XYblg' UbX' Yb' \UbW' gi XYbhYb] U Ya Ybh
YgdYMU' m' Xi f] b] ' i bd' UbbyX' X] g' fi dh] cbg' g' W' Ug' 7CJ -8!% "

FYZfYbWg

5XUf_k UZA "5"frs&E"Î≠m bchU Ubgicb`lBYHMUW]b[žVi hk \UuUci hi gĀ. =7H]b; \UbUdcgh7cj |Xl%"
 9X W]cb UbX-bZfa U]cb HWWbc`c[]Yg&ž%*) Ĩ% ,) ""\hdg##Xc]cf[#s%ss+#g%* - !s&s!s' %n"
 5_ Ybž@Gž/ K YgžG"; "fl%-l%A i 'hd'YfYfYgcb. Hg]b['UbX]bhfdYf]b[]bhfUMcbg"GU Y"
 5 ZU'ž6" frs%l' K \m]b]m fU]b['hWbc`c[m\UgVYb i bg WggZ `]b'? i k U]B5b`Yl d'cfUcfrnigi Xni 9!
 @Ufb]b['UbX8][]U'A Y]Už% f!(fz%&!% - "\hdg##Xc]cf[#s%ss+#s(&)' s%*+& s%
 5\UYYž5'ž/ 'Fck `Ynz>"frs%l'9! Yfb]b['W]h]W'g WggZMf'g'7ca dUf]b['dYfgdYm] YgZca UWXa]W
 gUZZUbXgi XYblg"7ca di hfg/ '9X W]cbž%&ž%& "\hdg##Xc]cf[#s%ss%#^Wa dYi "ss" "s" "ss+
 5'a U]UžA "5'ž5'!?' \U]k bYž5'ž/ '5`h i b]U]ž5" frs&E"9l d'cf]b['hY W]h]W' WU`Yb[Yg UbX ZMf'g'
]bZi YbW]b['hY 9! Yfb]b['gngha` i gU Y Xi f]b['7CJ-8!%` dUbXa]W 9X W]cb` UbX -bZfa U]cb`
 HWWbc`c[]Ygžž) &%) & s "\hdg##Xc]cf[#s%ss+#g%* - !s&s!s%& !m
 5n] Ycž: "Gž X]GyUž 5" 5'ž/ 'G Yf]bž 6" @' frs&E" 5b`Yj c]]b['ZUa Yk cf_`Zf`XYG]V]b['gi XYbh
 Yb[U Ya Ybh]b` W]g'cca` UM]]hYg" HAY <ci fbU` cZ A U]a U]W' 6YU]]cž 'frž &S!&- "
 \hdg##Xc]cf[#s%ss%#^a U]V's%&%'SS' ..
 6UbXi fUž5" fl% +l' GcWU` Yfb]b['h YcniB Yk Mf_.; YbYU`@Yfb]b['DfYg"
 6UfUfXž@ž@ubžK "MžHcžM'A "žDUcbžJ "C'ž/ '@UžG"@' frs&E' A YU] f]b['gYZfYi U]cb]b`cb`]bYUbX`
 VYbXYX` Yfb]b['Yb]fcb a Yblg" HAY -bhfbYh UbX <][\Y' 9X W]cbž %&fž %*"
 \hdg##Xc]cf[#s%ss%#^] YXi W&SS' %s'ss)
 7Ua Už@žJ UYfž5'ž/ 'J YbXYf`žA "frs&E" H YHMUW]f'gi XYbhYU]cbg]d']b`h Yi gY cZg'WU` bYk cf_`
 ghYg`Zf` YXi W]cbU` di fdcgYg` U gngha U]WYf]k " <ci fbU` cZB Yk` 5 ddfcUWg]b` 9X W]cbU` F YgUFWž
 %s%fž% +l%)* "\hdg##Xc]cf[#s%+, &#bUf'&ss%ž) - %
 7Ug]XnzGž/ '9UWi gžD' frs&E" 8 Y Ycd]b['h YWa di hf`i gY gY ZYZZ]W]f'f' G9LgWY` -b] Yg] U]b['h Y
 fYU]cbg]d Yk Yb Wa di hf`gY ZYZZ]W]f'f' YbXYf` UbX Yl dYf]YbWk]h Wa di hf`g` <ci fbU` cZ9X W]cbU`
 7ca di h]b[F YgUFWž&frž% !%) "\hdg##Xc]cf[#s%& s%#> -F!S? J @< F: +!; 7BJ`
 7\YbžD' !G8'ž@Ua Vflž 5'8'ž/ ; i]Xfnž? "frs&E" 9b[U]b['cb`]bY` YfbYfg` hY]a dUMcZk YV]UgX`
 Yfb]b['HWWbc`c[m] cb` W`Y] Y gi XYbh Yb[U Ya Ybh' 7ca di hf` / ' 9X W]cbž) (ž %&& %& &
 \hdg##Xc]cf[#s%ss%#^Wa dYi "ss" %s'ss)
 7]f]ga Ubbž9" D' frs&E' 5`Wa dUf]g'c`Zh YUW]Y] Ya YbhcZg]U]g]W]gi XYblg`Ybfc`YX]b`cb`]bYUbX`ZUW!
 hc!ZUW]g]h]b[g'9!@Ufb]b['UbX8][]U'A Y]Už% f fž' &' !' s "\hdg##Xc]cf[#s%ss+#s(&)' s%+) & &
 7ca dYU ž8" F'ž/ < [[]bž7" 5" fl%-) E' 7ca di hf`gY ZYZZ]W]f'f' 8 Y Ycda YbhcZUa YU] fYUbX`]b]h]U`hgi`
 A =Gei Uhf nž% -!&ž% "\hdg##Xc]cf[#s%& s%#&(- , , .
 7cghYnz>ž/ @U] Yž7" frs&E' H Ya cXYU]b['YZMg`cZ[fci d'k cf_`cb`h YfYU]cbg]d Yk Yb`a ch] U]cb`
 UbX W]b]h] Y`cUk" HAY -bhfbU]cbU` F Y] Yk` cZ F YgUFW]b` C dnb` UbX 8]g]m hX @Ufb]b[ž % flž *, !- s"
 \hdg##Xc]cf[#s%ss%#^] ffcX`] %]% ' &
 8Uk gbž>": "frs%l' A cXYU]cb`]b`a UbU Ya YbhYgUFW. K \Užk \nžk \YbžUbX` \ck " <ci fbU` cZ6i g]bYg`
 UbXDgnWc`c[nž& flž% % "\hdg##Xc]cf[#s%ss+#g%* - !s%l' s]+`
 8\Uk Ubž G" frs&E" Cb`]bY` Yfb]b[. 5` dUbUMU]b` hY]a Y cZ 7CJ-8!%` W]g]g' <ci fbU` cZ 9X W]cbU`
 HWWbc`c[mGngha gž(- flž) !& "\hdg##Xc]cf[#s%ss+#ss(+&-) &s' (s%`
 8]b[ž @ž 9fž 9'ž/ ' C fYnz A " frs%l' 5b` Yl d'cfUcfrnigi Xni cZ gi XYbh Yb[U Ya Ybh]b[[Ua]ZYX` cb`]bY
 X]gWgg]cbg" 7ca di hfg/ '9X W]cbž%&ž%&!& "\hdg##Xc]cf[#s%ss%#^Wa dYi "ss" "s&ss+`
 : Yf[i gbž F" frs&E' @Ufb]b['UbUn]h]g' Xf] Ygž X] Ycda Yblg` UbX` WU`Yb[Yg' -bhfbU]cbU` <ci fbU` cZ
 HWWbc`c[m9b` UbWX@Ufb]b[ž(f] !ž' S(!' % "\hdg##Xc]cf[#s% s(#=>H9@s%&S) % %`
 : cfbY`ž7'ž/ '@UfWfž8": "fl%, %l' 9j U i U]b['gfi W] fU` Yei U]cb` a cXYg`k]h i bcVg]f] UY Yj Uf]UW Yg`UbX`
 a YU] fYa Ybh Yfcf" <ci fbU` cZ A U] Y]b[' F YgUFWž % flž ' - !) s"
 \hdg##Xc]cf[#s%ss+#ss&&(' +, %s% ss% s(`
 ; fU]a ž8" frs&E' D9GH9@ZMf'gZf`Y' Yfb]b['fY]ghX` H Y(9g`cZ]h lcf]b['Zf` j U i YUXXY` Yfb]b[" 9!
 @Ufb]b['UbX8][]U'A Y]Už% flž%!) "\hdg##Xc]cf[#s%ss+#s(&)' s%+) * &
 ; i dUžA 'ž/ 'DubXynž>" frs&E' =a dUMcZgi XYbhYb[U Ya Ybhc] UZM] Y`Yfb]b[. 9j]XYW`Zca `U`Uf[Y
 -bX]Ub i b] Yf]hmi 7i ffYbhDgnWc`c[nž` +flž(%!(& "\hdg##Xc]cf[#s%ss+#g%&(!s%l-) &&'`
 < Uf`>: "ž< i ž; "HA žF]b['Yž7'ž/ 'G]ghX]žA "frs%l' 5`df]a Yf`cb` dU]h]U` Y]h]gi Uf]gfi W] fU` Yei U]cb`
 a cXY]b[fD@G]G9A E`GU Y`
 < Yb]Yž 7" F'ž< Uj Yfcbž @' F'ž/ ; fU]a ž7" F" frs&E' A YU] f]b['gi XYbh Yb[U Ya Ybh]b` HWWbc`c[m
 a YX]UHX` Yfb]b[. 5` fY]k " 7ca di hfg` / ' 9X W]cbž -ž ' *)' "
 \hdg##Xc]cf[#s%ss%#^Wa dYi "ss" "s" "ss)

< ck UFXZG'? "ZA Uē>Z/ Mb[z>"fRS%L'Gh XYbhi 'Yg 9l d`cf]b[`dUhfbg'cZgh XYblg Wa di hf!YZWMMhUbX
 Yb[U Ya Ybhi k]h` Xj]]Hu` hWbc`c[]Yg]b` YUfb]b[" 7ca di hf'g / 9X Wjcbz %S%Z &!(&
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS,
 < i b[zA " @z 7`ci z 7`z 7`Ybz 7"< "Z/ `Ck bzN" M' fRS%L' @YUfbY' fYUX]bYgg' Zf` cb`]bY` YUfb]b[. GWY
 XYj Ycda Ybhi UbX` ghi XYbhi dYFWd]hcbg" 7ca di hf'g / 9X Wjcbz))fIz %\$, S!%\$-\$"
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS(
 -hi a Uē5 "fRS%L'5 b`Yj Ui U]cb`cZgh XYblg dYFWd]hcbg`UbX`Yb[U Ya Ybhi]h` Y!`YUfb]b[`Wa dcbYblg]b`U
 Wa di g` VgYX` i blj Yfghm` 5 Wj Y @YUfb]b[]b` <]\Y' 9X Wjcbz %S%Z)+!*,"
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS,
 >YggcbzF`ZA WU [\hcbzGzFcgYXUYzB`zN`i zHž/ `7cW`YzJ`"fRS%L'5`a]l YXla Yh`cXg`ghi Xnrc`]XYbhZni
 YZWMj Y dfUMWVg`]b`h`Y`HMUW]b[`cZk f]h]b[]b`U`Xj]]Hu`YUfb]b[`Yb]]fcb`a`Ybhi]b`ck`]bWa`Y`gWcc`g"
 7ca di hf'g/ 9X Wjcbz%%z%!" S"\hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS)
 ?Ui z9`F`"fRS%L": fUa]b[`ghi XYbhYb[U Ya Ybhi]b`]\ \Y`YXi Wjcb`"Gh XYj]b`<]\Y'9X Wjcbz', fIz+), !
 ++ "\hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS,
 ?i z; "8"fRS%L'H`YbU]cbU`g`fj YmcZgh XYbhYb[U Ya Ybhi`7cbWdhi U`UbX`Ya d]f]W`Zci bXU]hcbg" B`Yk`
 8]fWjcbgZf`-bg]h]h`cbU`FYgUFWz(%z)!&S"
 @UfXzH`B`z/ `?i z; "fRS%L'Gh XYbhYl dYf]YbWg`k]h`]bZfa U]cb`hWbc`c[mUbX`h`Yf`fYU]hcbg`d`lc`
 ch`Yf` UgdYWg` cZ` ghi XYbhi Yb[U Ya Ybhi` FYgUFW`]b` <]\Y' 9X Wjcbz (*fRz %S%Z &'"
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS,
 @UfV]5 dU z >" fRS%L' C`W`VYf` %L' 8c]b[`h`Y`f]]\h`h`]b[z`UbX`Xc]b[`h`Y`h`]b[`f]]\h`
 \hdg##k k k`i`blj`Yfghm`cf`XbYk`g`Wa`#dcg]d`d3]fcm] &SSS`&%SSS(,) *"
 @UfV]5 dU z>"G`a`deb]z?`z/ `?k`cZ]z6"fRS%L'Za`Um`L'6Uf]Yfgh`cb`]bY`YUfb]b[`U`cd]hcb`]b`]\ \Y`YXi Wjcb`"
 \hdg##k k k`i`blj`Yfghm`cf`XbYk`g`Wa`#dcg]d`d3]fcm] &SSS) S*SSS(+`+)
 @UfV]G]Uk`z`C`z/ `Ck`i`g`l5[nÁ`Ub`z`M`fRS%L'`A`]gW`Um`cZ`gh`XYblg`g`h`gZUM]cb`]b`Ub`Ugnb`Wfcbci`g`
 YUfb]b[`Yb]]fcb`a`Ybhi` `ci`fbU` `cZ` 9X`WjcbU` `hWbc`c[mi`Gng]h`g`z`)fIz`)*(+)"
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS,
 @Uk`gcbz`A`"5`z/ `A`Ugnbz`?"9"fRS%L'5`bUm]b[`dfcZ`Yg`dfYX]Wf`g`z`UbX`WbgYei`YbWg`cZ`gh`XYbhi
 Yb[U Ya Ybhi` X]gdc]hcbg" `ci`fbU` `cZ` GWcc` `DgnWc`c[nā`)'fRz` *! , *"
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS,
 @]bzK`"Gz/ `K`Ub]z`7"< "fRS%L'5`bWXYbWg`lc`Wb]h]bi`YX`]b]h]h]cbg`cZ`UXcd]h]b[`Y!`YUfb]b[`gng]h`a`]b`
 VYbXYX`YUfb]b[]b]gfi`Wjcb.5`Wb]h]b[YbW]ZUa`Yk`cf`VgYX`cb`a`cXY`g`cZ]bZfa`U]cb`gng]h`a`g`Wgg`
 UbX` H]g`!hWbc`c[mi`Z]h` 7ca di hf'g / 9X Wjcbz`), fRz` , , !-"
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS,
 @C]Yn]D]f]YrZA`"J`Z]D]f]Yn]@C]YrZA`"7`z/ `F`cXf]i`i`Yn]5`f]n]L`@`fRS%L'6`YbXYX`YUfb]b[]b`]\ \Y`YXi Wjcb`.
 Gi`XYblg`dYFWd]hcbg`UbX`h`Yf`fYU]hcb`lc`ci`hWa`Yg` 7ca di hf'g / 9X Wjcbz`)*z` , %!, &`"
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS`
 A`Uk`Uf]b[z?`"7`z@UgYbzF`z;`fU`Ua`z7`"F`z<`Yb]Yz7`"F`z/ `<`Uj`Yf`gcbz@`F`"fRS%L'`-bj`Yg]]U]b[`ghi`XYbhi
 Yb[U Ya Ybhi]b`VYbXYX`YUfb]b[`gY]h]b[`g`i`g]b[`Yl`dYf]YbW`g`a`d`]b[`UbX`gfi`W`fU`Yei`U]cb`a`cXY`]b["
 H`Y`-b]h]f]Yh`UbX`<]\Y'9X`Wjcbz`)z%&' "\hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS`
 A`Uf]Ufn]bz5`z@]h]Yc`bz5`z/ `J`c`1z; "fRS%L'5`fY`Xj]]Hu`bU]j`Yg`Ua`nā`cf`fYU]h]S]i`blj`Yfghm]ghi`XYblg`
 i`gY` `cZ` Xj]]Hu` hWbc`c[]Yg` 7ca di hf'g / 9X Wjcbz`) *fRz` (&!((S`"
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS`
 A`]bnz`G`fRS%L'`A`UfW`&L`"K`mi`A`cgh`9X`HWW` :`U`g` \hdg##k k k`"bg]XY]]\YfX`Wa`#Vc[g#]]\Yf]YX
 [Ua`U`k` \ma`cgh]YX]HW]Z]g`
 A`ccf]z`>`@z`8]Wgcb!8`YbYz`7`z/ `;`UmYbz`?"fRS%L'Y!@YUfb]b[z`cb`]bY`YUfb]b[z`UbX`X]g]UbW`YUfb]b[`.
 Yb]]fcb`a`Yblg` 5`fY` h`Ym` h`Y` g`La`Y3` H`Y` -b]h]f]Yh`UbX` <]\Y' 9X`Wjcbz` (%fRz` %&!%)`"
 \hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS`
 A`i`hgn]z8`"B`z/ `A`U`c` \Uz; "fRS%L'7`U`Yb[Yg`UZY]M]b[`U`cd]hcb`cZY`YUfb]b[]b`di`V]W`blj`Yfgh]Yg]b`
 ?`YbnU`9!@YUfb]b[`UbX8]]]Hu`A`X]L%`f]!(fz%`S!%)`+"hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS`
 B`U]hcbU`5`WXYX]H]hcb`6`cUX`W`5`6Q;` \UbU`fRS%L'5`WXYX]H]hcb]Ufm]b]g]h]h]hcbg]b];` \UbU`5`j`U`UVY`U`h`
 \hdg##bU]`cj` [\`#bYk`g#(++)bU]WbXi`Wg`W]W]W]f]Yj`Yk`!czi`blj`Yfghm]cZ]]\UbU` 5`WgYX` `cb`
 &S`#`&S`
 B`cf]h`Ynz; `z;`cj`]bXzF`z6i`W]Hž7`n]bg`zA`z8`c`UbzF`z/ `j`Ub`9`gWzD`fRS%L'H`Y`YZW]cZi` \Yf]UbX`
 bck`I` `YUfb]b[`cb` ghi`XYbhi`Yb[U Ya Ybhi`UbX` U]W]Ya`]WUW]Yj`Ya`Ybhi` 6f]hg` `ci`fbU` `cZ` 9X`WjcbU`
 hWbc`c[nā` (-fRz` %&' "\hdg##Xc]cf[#S%SS%#^Wa dYXi "SS%\$)"SS` , -`

C' Ccbbcfz? "fR&S'L'7cbgfi Wj] ga zWff]W i a 'UbX'h Y_bck 'YX] Yei Yg]cb. h'bg]cbg'UbX'WU'Yb] Yg'Zf' \][\Y' YXi W]cb" G]i X]g']b' <][\Y' 9X W]cbz %%%' G]X] UbW' cb]bY' di V]W]cbQ \hdg##Xc]cf[#%%&S, S#S S+) S+ "S&S%+) S,) .

C']j YfZ'Z' / < Yf]b] hcbz>"fR&S' E'9l d'cf]b] 'hWbc'c] ma YX]UHX'YUfb]b] 'Zca' UdYXU c] JW' dYfgdYWj Y' -bhfUWj Y@Ufb]b] '9bj]fcb] Yblg'%'fRz'%%&%' "\hdg##Xc]cf[#%%&S+*#] 'YY%%&%%&%' %* .

CfYnz 8" 7"z / ' FcgL' A " fR&S' E' 8 Yj Ycd]b] ' U a Uh Ya U]W' a cXY']b] ' W] fgY']b' U j]f]i U' 'YUfb]b] ' Ybj]fcb] Ybl'N8A 'A Uh Ya U]W'9X W]cbz) S]fZ%' !%) "\hdg##Xc]cf[#%%&S+*#g%), !S%!S' S!, .

Ck i g !5[nYa UbzMz/ '@UFV]G]Uk zC" fR&S' E'FYZUa]b] 'h Ydf]b]Wd'YcZgdYU]n]U]cb]]b' 'Y]]h]a U]cb WXY' h Ycfm] 5' VYbXYX' 'YUfb]b] ' dYfgdYWj Y' 9X W]cb' UbX' -bZfa U]cb' hWbc'c]]Yg' &f] IZ' &, ' !&S' " \hdg##Xc]cf[#%%&S+*#g%* - !S%!) *' !S' .

DYUfgbz >" A "z 6Ua Ub]U]f]z HZ 7fcgVnz @z / ' 7cbfUXz 9" fR&S' E' 5 b' Ya d]f]W']bj Yg]]U]cb]]brc' h Y' fYU]cbg]d' V]k Yb' cf]]b]n]U]cbU' W'h fY UbX' Wa di hf' YZ]W]h]Ug' a cXYUHX' Vm]U' Y UbX' [YbXYf' >ci fbU' cZ7ca di hf' -bZfa U]cb' G]h]a g' (' fRz) , !+S' "\hdg##Xc]cf[#%%&S, S#S, +((%'8S' '0% (+S, * .

DY'Ug'Z B " fR&S' E' H Y]bZi YbW' cZ Wa di hf' gY ZY Z]W]h]a YUW']b]]j Y gY ZfY]i ' U]cb' UbX' gY ZY g]h]a 'cb' g]i Xyb]h Yb] U Ya Ybh]b' cb']bY 'YUfb]b] ' dfc] fUa g' 9j]XybW' Zca' 'h Y j]f]i U' k cf' X' cZ GY WbX' @]Z' 7ca di hf]g]b' < i a Ub' 6YU]cfz') z% +!%+S' "\hdg##Xc]cf[#%%&S%# 'WV'8S% 'S&S(, .

D\]dZ Hz / ; Uf]Lz 5" fR&S' E' H Y]a dcf]UbW' cZ g] ' hUW]b] ' h Y] ; YbYU]cb' bYk' hWbc'c]]Yg' UbX' h Y' Wb]fU]]mi cZ dYXU c] n]i < Uj UfX' 9X W]cbU' Fy]kz , ' fRz ' S!' % " \hd.##X] 'Xc]cf[#%%&+*# 'Uf', ' &k &&*, [%) (i %) , "

Dcf]fzK " K "z; fUa z 7" F"z Gdf]b] z? " 5 "z/ ' K YWz? " F" fR&S' E' 6' YbXYX' 'YUfb]b] ']b' \][\Y' YXi W]cb' -bg]h] h]cbU' U]cd]cb' UbX']a d' Ya Yb]U]cb" 7ca di hf]g' / ' 9X W]cbz+) z %!) %)" "\hdg##Xc]cf[#%%&S%# 'Wa dYXi "8S% 'S&S%& .

DfYa 'U]Lz? " F"z/ ; Yh Lz H' J " fR&S' E' @YUfb]b] ' Wb]h]h]XyG]]b' UbX' 'YUfb]b] U]d]h]cb' Zcf' U]d]h]j Y Y! 'YUfb]b] ' Ybj]fcb] Ybh' U g' f] Yni 5fh]ZMU' -bh']]bW' Fy]kz ((fIz ((!(*)" "\hdg##Xc]cf[#%%&S+*#g%(*&S%)!- (' &n .

Dfc_Yg'z 7"z/ < ci gY z>" fR&S' E' 7ca a i b]]mi 7c' Y] YG]i Xyb]h]dYf]Wd]cbg' cZfYa chY' @YUfb]b] ' G]]Zg' 8i Ylc' 7CJ -8!% "HWHfYbXg'%' "G]X] UbW'cb]]bYdi V]W]cbQ \hdg##Xc]cf[#%%&S+*#g%) & !S&S) , +!, .

FU]a]z 9"z j Ub' Xyb' 6Yf] z > z / ' J Ybz K " fR&S' E' : U]]h]U]b] ' g]i Xyb]h]Xf] Yb' Wbg]fi W]b] ' cZ 'YUfb]b] ' Ybj]fcb] Yblg' i g]b] ' K YV' &S' dYfgcbU' 'YUfb]b] ' Ybj]fcb] Yblg' 7ca di hf]g' / ' 9X W]cbz , %&) !&*" "\hdg##Xc]cf[#%%&S%# 'Wa dYXi "8S% 'S&S%& .

FUg']Xz Hz / ' 5 g] \Ufz < " A " fR&S' E' hWbc'c]]mi gYz gY Z]X]fY W]h] 'YUfb]b] z g]i Xyb]h] Yb] U Ya Ybh UbX' U]W]Ya]WdYfZfa UbW' 9l Ua]b]b] ' h Y]b]hfYU]cbg" 7ca di hf]g']b' < i a Ub' 6YU]cfz *' z *S (!*& " \hdg##Xc]cf[#%%&S%# 'WV'8S% 'S) 'S, (.

FYmbLz > z < Ub' Ua z > z / ' A]YfzD' fR&S' E' H Y -bhfY Yh] d' cg]cbzX]]]U' a YX]Udf]b]Wd' Yg'UbX']a d']W]cbg]lc' Wa a i b] W]h] YZ]W]h] Ym]b' h Y X]]]U' g]dUW' 9!@YUfb]b] ' UbX' 8]]U' A X]Lz %fRz' *!) & " \hdg##Xc]cf[#%%&S+*#&S(&+) ' S%+) (' *% .

G.]bz B 'z/ ' 7\Ubz > ? " fR&S' E' 8]fYU]UbX']bX]fYU]W]Z]W]g' cZcb']bY' 'YUfb]b] 'cb' X]g]UbW' YXi W]cb" 6f]]h]g' >ci fbU' cZ9X W]cbU' hWbc'c] nZ') fIz &!) &, "\hdg##Xc]cf[#%%&S%# 'SSS-!%S' &S('SS' , - ' .

G.]bbYfz 9" 5 "z/ ' D]]mfz > F" fR&S' E' 8 Yj Ycda Yb]U' Xnb]Ua]W]cZg]i Xyb]h]Yb] U Ya Yb]zWd]b] zUbX' Yj Yfn]U]h] fYg]]YbW' -b < UbX' Vcc' cZfYg]UfW'cb' g]i Xyb]h]Yb] U Ya Ybh]fd" &%(('Gdf]b] Yfz6cg]cbz A 5" .

GcY]Lbrcz 8 "z/ ' A U]cbUXz A " fR&S' E' ; fci d' k cf' _UbX' h YWUb] YcZcVg]UW]g'cj Y']h]a Y' H Y]bZi YbW' cZ 'YUfb]b] ' g]m]Y' UbX' [fci d' Wa d'cg]h]cb" 5 W]j Y @YUfb]b] ']b' <][\Y' 9X W]cbz %fRz --!% " \hdg##Xc]cf[#%%&S+*#g%* - +, +(%+S+*% .

G]]g] dUk cb] zMz? ci 'zF'z B YbWU'YU]nz > z A i fd' nZ' 9"z / ' : fUbW]g'z 9" > " fR&S' E' H Y fYU]cbg]d' V]k Yb' gci fW]g' cZ gY ZY Z]W]h]]b' W]g]fcca' 'Ybj]fcb] Yblg' UbX' h Y g]fYb] h' cZ Wa di hf' gY ZY Z]W]h] VY]Yz' 9X W]cb' UbX' -bZfa U]cb' hWbc'c]]Yg' & fRz' , %+S' "\hdg##Xc]cf[#%%&S+*#g%* - !S%!) - *' S!% .

K Ub] zGzN Ub] z? "z 8i z A "z/ ' K Ub] zN" fR&S' E' 8 Yj Ycda Ybh]UbX' a YUg' fYa Ybh]j U]X]]mcZUb']bg]fi a Ybh Zcf' h Y]a dU]McZ]hWbc'c]]ma YX]UHX' 'YUfb]b] 'cb' 'YUfb]b] ' dfc'Wgg]g' 7ca di hf]g' / ' 9X W]cbz %&Z% %& & "\hdg##Xc]cf[#%%&S%# 'Wa dYXi "8S% 'S' 'SS' .

K ccXz F"z / ' 6UbXi fUz 5" fR, -E' Gc]U' W]]b]]j Y h Ycfm] cZ cf]]b]n]U]cbU' a Ub] U Ya Ybh' 5 W]Xa mi cZ a Ub] Ya Ybh]fY]kz %fIz' *% , ("\hdg##Xc]cf[#%%&S) (*) #Ua f% , - (& - S+* .

N]cVz? " 7"z K Yg]mfz 6" > z?]b] zF" 6"z @z > 7"z/ ' 7\i b] zH' G' fR&S' E' <][\Y' YXi W]cb' g]i Xyb]h]Yb] U Ya Ybh] gW]Y f] 9C9L' 8 Yj Ycda Ybh]UbX' dgn]Wca Yf]W]j]XybW' F]g]UfW']b' <][\Y' 9X W]cbz *fRz & !& (" \hdg##Xc]cf[#%%&S+*#g%&S%!) %&!* .

Appendix 1. The student engagement and online learning instrument

Engagement

Online engagement (ENGL)

I regularly use web-based resources and information designed specifically for the course.

I regularly use email and/or other electronic means (such as WhatsApp and Facebook) to contact friends in my programme.

I regularly use the internet for study purpose

The e-learning interface is friendly and does not require detailed sign-in information.

Cognitive engagement (ENGC)

I enjoy the intellectual challenge of courses I am studying.

I derive satisfaction from studying online.

I find my courses intellectually stimulating.

I am motivated to study amidst the COVID-19 pandemic.

Social engagement with peers (ENGP)

I regularly work with other students on course areas I have problems.

I regularly get together with other students to discuss courses online.

I regularly study with other students online.

I feel part of a group of students committed to learning online.

Instructional resource (INR)

I receive frequent communication regarding new learning materials online.

The electronic learning materials that are posted online are sufficient for my use.

The online test and quizzes are regularly posted online by my lecturers

The online learning portal enhance communication between students and lecturers

The online learning portal allows for course interactivity between lecturers and students

My lecturer is able to measure my learning progress online

The learning materials posted online is up-to-date

Institutional support systems and interventions (ISS)

I receive the needed support from staff when I need technical assistance.

I find it convenient to get information on the online courses and resources from my department.

We have internet connectivity for our assignments and classroom activities on campus.

The university provides us with adequate technical support in the online learning platform.

The university has clear policies on the use of online learning platforms.

Technology self-efficacy (TSE)

I am capable of solving my computer-related problems when I am using the online learning platform.

I am very comfortable doing class work that is put online.

I am capable of using the internet to find information I need in relation to my study.

I feel confident in performing the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS PowerPoint).

I feel confident in using the Internet (Google, Yahoo) to find or gather information for online learning.

Online learning environment (ENV)

I choose a location where I study for my online courses to avoid too much distraction.

I find the online learning environment very easy to use.

I know where I can study most efficiently for my online course.

I choose a time with few distractions for studying for my online courses.