

?]bXYf'i bX'8Ya c_fUh]Y.'K cf_g\cd! 9f[YVb]ggY'VY[Y]ghYfb'6YfbUi °

±b '6YfbUi 'ZUbX'X]Y'K cf_g\cd!FY]\Y' K ØbgW\Yb!HfÀi a Yb!
A UW\Yb° 'ghUhhž']b 'XYf'?]bXYffYW\hY'i bX'l a k Y`hgW\i hn
VY\UbXY`h'k i fXYb"



6YfbUi ž'8Yi hgWX `UbX'!5a `%("'⇒`)'&\$&) `ZUbX']a :: fY]nY]h\Ui g
MY``ck `]b`6YfbUi `XUg`Gca a YfZYgh`ghUhhž`VY]`XYa `X]Y`9f[YVb]ggY
XYf`K cf_g\cd!FY]\Y` K ØbgWXYb!HfÀi a Yb!A UWXYb° `dfÀgYbh]Yfh
k i fXYb" 8]YgY '\b]h]Uh]j Y`XYf`DUfhbYfgWX UZh`ZØf`8Ya c_fUh]Y`]b
6YfbUi `f]WX hYhY`g]WX `Ub'+!`V]g`%&!`À\f][Y`GWXØ`Yf]bbYb`i bX
GWXØ`Yf`i bX`h\Ya Uh]g]YfhY`k]WXh][Y`\b\U`hY`k]Y`?]bXYffYWXhYž
I a k Y`hgWXi hnž'5fa i h'i bX': f]YXYb" 8]Y`K cf_g\cd!FY]\Y`ghUfhYhY
]b`XYb`CghYfZYf]Yb`i bX`X]YbhY`b]WXh'bi f`XYf'_fYUh]j Yb`9bhZU`hi b[ž
gcbXYfb`Ui WX`XYf`GYbg]V]`]g]Yfi b[`ZØf`[YgY``gWXUZh`]WXY`H\Ya Yb"
5bhY`?fØ[Yfž'X]Y`g]WX`ZØf`X]Y`DUfhbYfgWXUZh`ZØf`8Ya c_fUh]Y
Yb[U[]Yfhz`Ài »YfhY`g]WX`dcg]h]j`@VYf`X]Y`YbhghUbXYbYb`K Yf_Y`XYf
?]bXYfž'X]Y`i bhYf`UbXYfYa `Y]b`gY`Vgh`[YghU`hYhYg`6UbbYf`ZØf`XYb
: f]YXYb`i bX`?]bXYfffYWXhY!H!G\]fhg`YbhX UfZyb"`9]b`XYfUfh][Yf

5 i gXfi W_j cb '? fYUh]j]hÀh'Z]bXYh'[fc» Yb '5b_`Ub['i bX'nY][hž'k]Y VYXYi hYbX'X]Y'A Y]bi b[gÀi » Yfi b['j cb'?]bXYfb']gh"

GWXk Yfdi b_hY XYf ?]b XYffYWXhY

 \exists FU\a Yb'X]YgYf'K cf_g\cdg'k i fXYb'X]Y'?]bXYf'b]W\h'bi f ; YbYfU`j YfgUa a `i b['j YfUVgW\]YXYhY '%-, - 'XUg VYfY]b_ca a Yb'ØVYf'X]Y'FYWkhY'XYg'?]bXYg ž'k Y`WkYg'U``Yb ? |bXYfbž'Ui » Yf'XYb'I G5ž'FYW\hY' j Yf`Y]\hž'X]Y' j cb'9fk UW\gYbYb b]W\h'UV[YgdfcW\Yb'k YfXYb'XØfZYb"8Uni 'n\A\`Yb'i bhYf'UbXYfYa $XUgFYWhUiZ_VYfYVYbž9bhk]W_ib[žGWAihnibX6]Xib["$ 8 | Y g Y · F Y W h Y · k Y f X Y b · | b · 8 Y i h g W \ ` U b X · g Y | h · X Y f · F U h | Z | U h | c b · % - - & ž k Y`W\Yf'&\$%\$`c\bY`JcfVY\U`hY`Zc`[hYž'ghUf_']b`XYb`JcfXYf[fibX [YghY``h"'8YbbcW\`nY][h'g]W\ž'XUgg'j]Y`Y'AYbgW\Ybž'gY`Vgh']b j YfUbhk cfh`]WXYb Dcg]h]cbYbž'b]WXh'Ui gfY]WXYbX']bZcfa]Yfh'g]bX $\emptyset VYfX]Y=b\setminus UhYibXXYfYbIagYhnib["8]Y=b]h]Uh]jY$ 8 Yac_fUh]Y``YVYb°ibhYfghØhnhi[YbUi`X]YgY'5iZ_`Àfib[gUfVY]hž $X]Y^{-}]b^{-}6YfbUi^{-}Xi^{-}fWk^{-}X]Y^{-}K^{-}cf_q^{-}cdq^{-}k^{-}Y]hYf[YZ\emptyset^{-}fh^{-}k^{-}]fX^{-}8]YgY$ JYfa]hhi b['j cb'K]qqYb'i bX'FYWXhYb']qh'YqqYbn]Y``ž'XUa]h'?]bXYf]\fY'Gh]a a Y'Yf\YVYb'i bX']\fY'A Y]bi b['Ài » Yfb'_ÒbbYb"

9]b'k Y]hYfYf'5gdY_h'XYf'K cf_g\cdg'k Uf'XYf'I a k Y`h!'i bX
?`]a UgW\i hn"'6YfY]hg']b'XYf'; fi bXgW\i `Y'`YfbYb'?]bXYf\u00e4
JYfUbhk cfhi b['ni 'ØVYfbY\a Yb'i bX'ni f'JYfVYggYfi b[']\fYf
I a [YVi b['VY]ni hfU[Yb"'9bYf[]Y'Y]bYg'Dfc'Y_hg'k]Y' K ØbgW\Yb!

Hfài a Yb!A UWXYb° k]fX'cZh'Ui WX'Xi fWX'`c_U`Y'6Ya Ø\i b[Yb [YZÒfXYfhž'X]Y']b'j]Y`Yb'GhÀXhYb'VYfY]hg'YfZc`[fY]WX'i a [YgYhnh kYfXYb"'8]Y'I bhYfghØhni b['Xi fWX'XUg'6i bXYgdfc[fUa a 8Ya c_fUh]Y'`YVYb°']gh'Y]b'6Ui ghY]bž'XYf'XYb'?ca a i bYb'\]`Zhž VØf[Yf`]WXY'DUfh]n]dUh]cb'Y]bni ZØ\fYb'i bX'ni 'ZÒfXYfb"

; Yd`UbhY'5_h]j]hÀhYb'i bX'5i gV`]W_

=a '<]bV`]W_'Ui Z'X]Y`_ca a YbXYb`A cbUhY`ghY\Yb`]b`6YfbUi `VYfY]hg k Y]hYfY`gdUbbYbXY`5_h]j]hÀhYb`Ubž`XUfi bhYf`Y]bY`6Ài a Y!

DZUbnU_h]cb`i bX`Y]b`VYgcbXYfYf`6UW_hU[ž`XYf`g]W\`a]h`XYa

H\Ya U`5fa i h`Ui gY]bUbXYfgYhnh"`8]YgY`=b]h]Uh]j Yb`nY][Ybž`k]Y`X]Y

GhUXh`_cbh]bi]Yf`]W\`XUfUb`UfVY]hYhž`X]Y`?]bXYf`]b`k]W\h][Y
[YgY``gW\UZh`]W\Y`8]g_i gg]cbYb`Y]bni V]bXYb`i bX`]\bYb`Y]bY

D`UhhZcfa 'ni V]YhYbž`Ui Z'XYf`g]Y`U_h]j 'k YfXYb`_ObbYb"

5 V g W `] Y » Y b X `` À g g h `g] W ` g U [Y b ž ` X U g g `g c ` W Y ' + b] h] U h] j Y b ` k] Y ` X] Y K c f _g \ c d ! F Y] \ Y ` K Ø b g W Y b ! H f À i a Y b ! A U W Y b ° ` b] W h h b i f X] Y ? f Y U h] j] h À h i b X ` X U g `G Y ` V g h V Y k i g g h g Y] b ` X Y f ` ?] b X Y f ` Z O f X Y f b ž g c b X Y f b ` U i W ` Y] b Y b ` k] W h] [Y b ` 6 Y] h f U [`ni f `G h À f _ i b [` X Y f ?] b X Y f f Y W h Y ` ` Y] g h Y b " `G] Y ` g] b X ` Y] b ` 6 Y] g d] Y ` ` X U Z Ø f ž * k] Y ` ` c _ U ` Y D f c Y _ h Y ` X i f W ` Y \ f Y b U a h`] W Y g ` 9 b [U [Y a Y b h i b X ` I b h Y f g h Ø h n i b [U i Z ` 6 i b X Y g Y V Y b Y ` ni ` Y] b Y a ` ` Y V Y b X] [Y b ` A] h Y] b U b X Y f ` V Y] h f U [Y b _ O b b Y b " · 8] Y ` + b h Y [f U h] c b ` j c b ` 6] ` X i b [` Ø V Y f ` ?] b X Y f f Y W h Y ` i b X g c n] U ` Y ` H \ Y a Y b `] b ` X Y b ` 5 `` h U [` X Y f ` ? ` Y] b Y b `] g h i b Y f ` À g g `] W X ž i a Y] b Y `] b Z c f a] Y f h Y ` i b X ' j Y f U b h k c f h i b [g j c ` ` Y ` ; Y b Y f U h] c b \ Y f U b n i n] Y \ Y b "

K Y]hYfY → Zcfa Uh]cbYb 'ØVYf'X]Y 'H\Ya Uh]_'XYf'?]bXYffYW hY 'i bX XYfYb'I a gYhni b[']b'8 Yi hgW\`UbX'g]bX'VY]'XYf'6i bXYgnYbhfU`Y ZØf'dc`]h]gW\Y'6]`Xi b['bUW\ni `YgYbž'X]Y'g]W\'U_h]j 'a]h'XYf GhÀf_i b['j cb'?]bXYffYW\hYb'Ui gY]bUbXYfgYhnh"'5i W\'Dfc[fUa a Y ni f'8 Ya c_fUh]YV]`Xi b[']b'?]hUg'\UVYb']b'XYb'`YhnhYb'\J\fYb'Ub 6YXYi hi b['[Yk cbbYb'i bX'_ÒbbYb'i bhYf'6]`Xi b[ggYfj Yf Y]b[YgY\Yb'k YfXYbž'X]Y'i a ZUggYbXY'Dfc Y_hY'ni f': ÒfXYfi b['XYf DUfh]n]dUh]cb'k À\fYbX'XYf'ZfØ_]bX`]W\Yb'9bhk]W_`i b['j cfghY``Yb"

8 Y hU]`g	
Cfh	6YfbUiž'8Yi hgWX`UbX
EiY``Yb	VUfb]a !U_hi Y``"XY
	• k k k "VdV"XY
	k k k "V]`Xi b[ggYfj Yf"XY

6Ygi WXYb G]Y i bg Ui Z b!U["bYh