

B Y I h!; Y b 'GhUV `Y Wc]b 'A 9H5 '%'79L @]gh]b [g '[Y \ Y b '`]j Y

ODF 9GG F 9@95G9 ' '6cWU'F Uhcbž': `cf]XUž') h\ 'C WhcVYf'&\$&WQ A 9H5 %ž'Y]b 'A i `h]! 5ggYh! 6UW_YXžgY`VghgW\ AhnYbXYf GhUV`YWc]bž'gc```]b XYb '_ca a YbXYb 'K cW\Yb 'Ub 'a Y\fYfYb 79L g'fhYbhfU`]g]YfhYb '6ÒfgYbŁ'bch]Yfh'k YfXYb" @Ui h'XYb 9bhk]W_`Yfb XYf 'D`UhhZcfa ']gh'A 9H5 '%'7c]b 'k]fX']b 'XYb bÀW\ ghYb '* \$ 'HU[Yb 'XYb < UbXY` 'Ub ']bhYfbUh]cbU`Yb '6ÒfgYb Ui ZbY\a Yb "8]Y '[YbUi Yb '6ÒfgYbž'Ub 'XYbYb 'XYf'Hc_Yb bch]Yfh'k YfXYb 'gc``ž'i bX'X]Y 'HU[Yž'Ub 'XYbYb 'YXY '6ÒfgY'X]Y Wc]b ']gh']a a Yf'bcW\ 'Y]b 'ghfYb['[Y\ØhYhYg':]fa Yb[Y\Y]a b]gž UVYf'X]Y '9bhk]W_`Yf'\UVYb 'Ub[Y[YVYbž'XUgg'X]Y'? Ua dU[bY Ua '%" C_hcVYf'&\$&%'VY[Ubb" '8 Ug'A 9H5 '%'7c]b '8]Y '@]ghi b[[Y\ha]h'XYf'^2 ZZbi b['j cb '5i gnU\`i b[ghcfYb 'ZØf'6Ybi hnYf / Ua d\Y'`]d/

ODF9GG'F9@95G9' '6cWU'FUhcbž': `cf]XUž') h\ 'CWhcVYf'&\$&%Q

A 9H5%žY]b A i `h]!5ggYh!6UW_YXž'gY`VghgW.ÀhnYbXYf'GhUV`YWc]bž gc```]b XYb _ca a YbXYb K cW.Yb Ub a Y\fYfYb 79Lg fhYbhfU`]g]YfhYb '6ÒfgYbŁ'bch]Yfh'k YfXYb "@Ui h'XYb '9bhk]W_`Yfb XYf D`UhhZcfa ']gh'A 9H5 '%'7c]b k]fX']b XYb 'bÀW.ghYb '* \$ 'HU[Yb XYb < UbXY``Ub ']bhYfbUh]cbU`Yb '6ÒfgYb 'Ui ZbY\a Yb "'8]Y [YbUi Yb 6ÒfgYbž'Ub XYbYb 'XYf'Hc_Yb 'bch]Yfh'k YfXYb 'gc``ž'i bX'X]Y 'HU[Yž Ub XYbYb 'YXY '6ÒfgY X]Y 'Wc]b ']gh']a a Yf'bcW. 'Y]b 'ghfYb[[Y\ØhYhYg':]fa Yb[Y\Y]a b]gž'UVYf'X]Y '9bhk]W_`Yf'\UVYb Ub[Y[YVYbž'XUgg'X]Y '? Ua dU[bY 'Ua '%''C_hcVYf'&\$&%'VY[Ubb"

8 UgʻA 9H5 '%'7c]bʻ8]Yʻ@]ghi b[ʻ[Y\h'a]h'XYfʻ² ZZbi b[ʻj cb 5 i gnU\`i b[ghcfYbʻZØfʻ6Ybi hnYfʻY]b\Yf"'5`gʻHY]``X]YgYfʻGhfUhY[]Y \UVYbʻX]Yʻ9bhk]W_`YfʻUi W\ʻa]h'XYfʻ\bhY[fUh]cbʻj cb G]W\Yf\Y]hgdfchc_c``YbʻXYfʻ9bhYfdf]gY!?`UggYʻVY[cbbYb" \bgVYgcbXYfY`\Uh'g]W\ʻA 9H5 '%'a]h'XYfʻ6`cW_W\U]b! G]WXYf\Y]hgZ]fa U'Hcfi g'ni gUa a Yb[YhUbž'i a 'dUggk cfh`cgY 5ba Y`XY`Ògi b[Yb'ZØf'XUg'BYhnk Yf_'VYfY]hni ghY``Yb"

8 UgʻDfc Y_hʻ\Uhʻg]WkʻUi Wkʻa]hʻJc]WY \(\frac{1}{2}\) ini gUa a Yb[YhUbʻzi a 'X]Y V]ca Yhf]gWkYʻ&: 5!5i h\Ybh]Z]n]Yfi b['ni ']bhY[f]YfYb"'8]YgYf A YWkUb]ga i gʻUfVY]hYhʻa]hʻXYbʻDʻUhhZcfa Ybʻni gUa a Ybʻ8 9Lʻi bX K UʻʻYhʻni a 'GWki hnʻj cbʻ? fmd hcVYghAbXYb"'9]bn][Ufh]['_ObbhY`X]Y : i b_h]cbʻA 9H5ʻ%ʻXUVY]ʻ\YʻZYbʻzʻgY]bYʻdfcdf]YhAfYʻ Bi fʻZØf A YbgWkYb !F]Wkh`]b]YʻXi fWkni gYhnYb"'8]YgYgʻDfchc_cʻij YfV]YhYh K YfhdUd]YfZ]fa YbʻzʻI bhYfbY\a Ybʻi bXʻFY[]Yfi b[YbʻXYbʻ6Yg]hn j cbʻA 9H5ʻ%ʻ7c]bg"'8 UgʻN]Yʻ`XYgʻGmghYa gʻ]ghʻYgʻz'NYbhfUʻ]g]Yfi b[ʻz K Uʻa Øʻ`_]ddYbʻi bXʻBYhnk Yf__cffi dh]cbʻni j Yf\]bXYfb"

9]b'@Ui bW DUX

 $8 \ Ug'9bhk \] \ W_i b [ghYUa '\]bhYf'A 9H5'%'7c]b'gdfUW 'ØVYf'X]Y k \] \ W_i b [YbghY]bYž'X]Y'XUg'BYhnk Yf_'ni 'YffY]W Yb'VYfY]h']gh'' A 9H5'%'7c]b g'; fØbXYf'FcVYfh'D''8i b`Ud'gU[hY.' K]f'ZfYi Yb'i bgž A 9H5'%'XYf'K Y`h'ni 'dfÀgYbh]YfYb'i bX'Y]bY'GhUfhfUa dY'ZØf'Y]bY K Y`h'XYf': fY]\Y]h'i bX'XYg', VYfZi ggYg'ni 'V]YhYb''$

A 9H5 % 7c]b % 9]b a Y\fgWX]WX h][Yg 8Y:]! 2 _c gmghY a

 $8 \ Ug`A \ 9H5`\%`7c]b`Z b[]Yfh`U`g`6 Ug]ggWX]WX h`Y]bYg`ZUWY hhYbfY]WX Yb \\ 8 \ Y:]!^2 \ _cgmghYa \ gž`XUg`Y]bYb``Y]ghi b[gghUf_Yb`8 9L`fXYnYbhfU`Y \\ 6 \ OfgYŁZ`GdUf_cbhYbZ`8 Y:]!GhU_]b[!:ib_h]cbYb`ibX`Y]bY`?fmdhc! \\ J = 65!8 YV]h_UfhY`ia ZUggh"`8]YgY`?ca V]bUh]cb`ZcfhgWXf]hh`]WX Yf :ib_h]cbYb`ibhYfghØhnh`5b`Y[Yf`VY]`XYf`JYfa O[Ybg[YbYf]Yfib["9g`gWXUZZh`UiWX`Y]bY`cdh]a]YfhY`A O[`]WX_Y]h`ZØf`?fmdhc! \\ = bj YghcfYbZ`]\fY`6YghAbXY`Uigni[YVYb"$

8i b`Ud'Yf_`ÀfhY'_Øfn`]W\']b'Y]bYa '\D`UhYfj]Yk 'X]Y'A ch]j Uh]cb'\]bhYf XYa 'Dfc'Y_h"'9f'VYgW\f]YV'X]Y'D`UhhZcfa 'U`g'Y]bY'A Ò[`]W_Y]h'ZØf fY[Y`a À»][Y'6Ybi hnYfž': Ø``Y'ni 'ZÒfXYfbž'XUg'9][Yb_Ud]hU``ni ghY][Yfb'i bX'X]Y': fY]\Y]h'XYf'A YbgW\\Y]h'ni 'ZÒfXYfb"'5`g'HY]` gY]bYf'GhfUhY[]Y'ghY``hY'Yf'g]W\'Y]b'_ca d`YhhYg'8Y:]!² _cgmghYa

j cfž:XUgʻa]hʻY]bYa ʻGhUV`YWc]bʻXYfʻbÀWXghYbʻ; YbYfUh]cb Ui Z[YVUi h'k i fXY"

a; Y[YbgUhn'ni 'ZfØ\YfYb'[c`X[YXYW_hYb'Hc_Yb'`Y]hYh'A 9H5'% XYb'K Yfh'Ui g'Y]bYa '?cfV'j cb'[c`XVYnc[YbYb'JYfa Ò[Ybgk YfhYbUV"'8Yf'Hc_Yb']bhY[f]Yfh'Ui WX'Y]bYb'Ga Ufh'7cbhfUWhž'XYf'XYbJYf_Ui Z'Ui Z'XYb'Hc_Yb!K Yfh'cXYf'\Ò\Yf'VY[fYbnh"'8]YgYGhfUhY[]Y'j Yf`Y]\h'XYa 'A 9H5%'''a Y\f'GhUV]`]hÀh'7c]bž']bXYa 'X]Y; YZU\f'j cb'Di a d!UbX!8i a d!GmghYa Yb'VYgY]h][h'k]fX"

A 9H5BCA = ?

6Y] A 9H5BCA =7g'[Y\hYg'XUfi a ž'?cffi dh]cb'ni 'VY_Àa dZYb'i bX K c\`ghUbX'a]h'U``Yb'Bi hnYfb'ni 'hY]`Yb"8]Y'8Y:]!5hhf]Vi hY'XYg BYhnk Yf_gž'k]Y'X]Y'\cWj Yfn]bg`]WXYb'GdUf_cbhYbž'a UWXYb'8f]hhYk]Y'NYbhfU`VUb_Yf'ØVYfZØgg]["'8i fWX'X]Y'9`]a]b]Yfi b['X]YgYf_cghgd]Y`][Yb'; UhY_YYdYf'Ui g'XYf'; `Y]WXi b['g]WXYfb'g]WX'X]Y 6Ybi hnYf'\Ò\YfY'6Y`c\bi b[Yb"Ni a '6Y]gd]Y``A 9H5'%'7c]b 6Ybi hnYf'j cb'GdUf_cbhYb'j YfX]YbYb'%\$'i '5DM[Y[YbØVYf'XYa GUhn'=\fYf'`c_U`Yb'6Ub_j'cb'\$ž&)'i "

 $8 \ Ug' < YfnghØW_'XYg'A 9H5BCAA = 7g!Ib]j Yfgiag']gh'Y]bY'gdYn]Y``Ybhk]W_Y`hY'6`cW_W&U]b'XYf'j]YfhYb'; YbYfUh]cb''8]Y'A 9H5! \\ 6`cW_W&U]b'V]`XYh'X]Y'; fibX`U[Y'ZØf'X]Y'UbXYfYb'Hcd!: YUhifYg XYg'BYhnk Yf_g''9g']gh'hfUbgdUfYbhYfž'g_U`]YfVUfYf'ibX'g]W&YfYf U`g'gY]bY'Jcf[Åb[Yf''$

9bhk]W_`Yf'_ObbYb`Ui Z'XYa 'CdYb!Gci fWY!7cXY'i bX'XYf'DYYf!hc! DYYf!5fWk]hY_hi f'XYg'BYhnk Yf_g'Ui ZVUi Ybži a 'fcVi ghY'i bX]a a Yfg]j Y'8 Uddg'ni 'YfghY``Yb"'9g'V]YhYh'XYa '89L'Ui Wk'Y]bYb HfUbgU_h]cbgXi fWkgUhn'Ui Z'XYa 'B]j YUi 'XYf'B5G85E!6ÒfgY"'8Yf A 9H5'89L'V]YhYh'6Ybi hnYfb'Y]bY'g]WkYfY'i bX'cdh]a]YfhY A O[`]Wk_Y]hž'Hcd!?fmdhck À\fi b[Yb'ni '\UbXY`b"

8]YgYf'89L'c\bY'JYfkU\fib['Yfa Ò[`]Wkh'Yg'6Ybi hnYfbž'Hc_YbUi g'XYf'G]WkYf\Y]h']\fYf'KU'`Yhg'ni '\UbXY`b"'8]YgYg'GmghYaVYgY]h][h'6YXYb_Yb'VYnØ[`]Wk'BYhnkYf_Ui gZÀ``Ybž5_hi U`]g]Yfi b[gj YfnÒ[Yfi b[Yb'i bX'UbXYfY'DfcV`Ya Yž'X]Y'XYfnY]h

79L!6Ybi hnYf'd`U[Yb"'9g'j Yfgcf[h'XUg'A 9H5BCA =7g!l b]j Yfgi a Ui W. 'a]h'`YVYbgk]W\h][Yf'@]ei]X]h\h'"

VYf'A 9H5'%'7c]b

A 9H5 % 7c]b]gh'Y]b df]j UhYgʻI bhYfbY\a Ybʻa]h'G]hn'Ui » Yf\U`V XYf nYbhfU`]g]YfhYbʻ5 i Zg]W\hgVY\ÒfXYb" 8]Y 'D`UhhZcfa 'V]YhYh Ubcbma YbʻNi [f]ZZ'Ui Z'8Y:]!: i b_h]cbYb" \Rightarrow bhYfYgg]YfhYž'X]Y 'a Y\f \emptyset VYf'A 9H5 % YfZU\fYbʻa \Diamond W\hYbʻ7c]b _Ubb'X]YgYg'Y]bn][Ufh][Y X][]hU`Y 5ggYh'Ui Z'XYf'df]j UhYb'A 9H5 '9I W\Ub[Y'Z]bXYb"

8 Y hU] `c

6Ygi WXYb G]Y i bg Ui Z _fmdhc!bYk g"Uh