

5ggYgga Ybh

5ggYgga Ybh'hUg_	K Y][\h	8iY'8UHY	7 ci fgY @YUfb]b[Ci HWca Yg 5ggYggYX
%"·Cb`]bY·Ei]nnYg	&\$I	8if]b['WUgg	%ž'&ž'' ž'(ž') ž'*
&"`5gg][ba Ybhg	' \$I	A cbXUm'%)) da 'cb'Y]h\Yf h\Y Zc``ck]b[k YY_cf'h\Y k YY_UZhYf"	%ž &ž' ž'(ž') ž'*
' "':]bU`'YI Ua) \$1	H65	%ž'&ž'' ž'(

5ggYgga Ybh'% 'Cb`]bY Ei]nnYg

GHUFFIXWMY. 8i f]b['WUgg 8i Y'XUHY. 8i f]b['WUgg

 $\label{thm:continuity} $$H\ \g'UggYgga\ Ybh'Wcbg]ghg'cZU'gYf]Yg'cZcb`]bY'k\ YY_`mei\]nnYgž'[\]j\ Yb'VYZcfY'UbX'Xi\ f]b[\ 'h\Y'k\ YY_`m'h\ hcf]U`'WUgg''$

5 X X] h] c b U ` 'X Y h U] `

1	

FYgci fW/g

FYWca a YbXYX FYgci fWYg

HYI hVcc_g

- 6]ca YVXUb]Vg. 7]fW`Uh]cbžVmiM'7": i b['fBYk 'Mcf_. 'Gdf]b[Yfž'% *Ł"'BchYž'Ub'YUf]Yf'YX]h]cb'Vm h\Y'gUa Y'Ui h\cf'!'6]cXmbUa]Vg. 7]fW`Uh]cb'fBYk 'Mcf_. 'Gdf]b[Yf!J Yf'U[ž'%, (Ł'!']g'Uj U]'UV'Y']b h\Y'`]VfUfm'
- A W8cbU`X'g`V`ccX`Zck`]b`UfhYf]Yg.`h\YcfYh]W*Yl dYf]a YbHU``UbX`W]b]WU``df]bW]d`YgžYX]hYX`Vm K]`a Yf`K "`B]W\c`g`UbX`A]W\UY`: "`C'F ci f_Y`fl@cbXcb.'9Xk UfX'5fbc`Xž% \$Ł"
- 7 UfX]cj UgW`Uf`d\mg]c`c[mž`VmFcVYfhA"`6YfbY`UbX`AUth\Yk`B"`@Yj mfGti`@ci]g.`AcgVmž&\$\$%L"
- 6]cZi]X'a YWXUb]Wg. "h\Y'\i a Ub WJfWi `Uh]cbž'Vm? f]g\bUb'6"'7\UbXfUbž'GhUb`Ym9"'F]hh[Yfgž'UbX'5']h

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

@UVcfUlrcfmfYdcfhg`UbX`a U'cf`Ugg][ba Ybhg`k]``fYei]fY`U`<u>Bcb`D`U[]Uf]ga `8YWUfUh]cb`7cjYf`G\YYh</u>'

5gg][ba Ybhgʻg\ci `XʻVYʻgi Va]hhYXʻcbʻhja Y"ʻ5ʻXU]`mdYbUʻhmcZ) ı 'cZh\Yʻa Uf_gʻUj U]`UV`YʻZcfʻh\Uh Ugg][ba Ybhk]```Udd`mZcfʻk cf_ fYWY]j YXʻUZhYfʻh\YʻXi YʻXUhY"ʻ5bmUgg][ba Ybha cfYʻh\Ubʻ) 'XUmgʻ`UhYʻk]``bch VYʻUWWYdhYX"ʻH\Yʻcb`mYl Ya dhjcbʻk]```VYʻk \Ybʻdf]cfʻdYfa]gg]cbʻZcfʻ`UhYʻgi Va]gg]cbʻ\UgʻVYYbʻ[fUbhYXʻVm h\Yʻ7 ci fgYʻWccfX]bUhcf"ʻ91 hYbg]cbgʻk]```VYʻ[fUbhYXʻcb`mcbʻa YX]WUʻ`cfʻWca dUgg]cbUhYʻ[fci bXgʻi bXYf YI hYa YʻW]fW a ghUbWfg"

5 WUXYa]W<cbYghmUbX D`U[]Uf]ga

D@5; -5F - €A

 $6Yk\ UfY^{**}5b^{*}Ugg][\ ba\ Ybhh\ Uh']bWi\ XYg^{*}d^{*}U[\]Uf]gYX^a\ UhYf]U^{*}k\]^{**}fYW^{*}]j\ Y^{*}U^{*}s \quad \vdots \ U]^{*}z^{*}UbX^{*}ghi\ XYbhg^{*}k\ \ c^{*}d^{*}U[\]Uf]gY^{*}k\]^{**}Uj\ Y^{*}h_Y]f^{*}bUa\ Yg^{*}YbhYfYX^{*}cb^{*}U^{*}U[\]Uf]ga\ fY[\]ghYf^{*}UbX^{*}k\]^{**}VY^{*}]UVY^{*}hc^{*}X]gW]d^{*}bUfmUW]cbz^{*}]bWi\ X]b[\ YI\ Wi\ g]cb^{*}Zca\ Ybfc^{*}a\ Ybh'^{*}U$

 $\pm i]g'Yl \ dYWMYX'h\ Uh'U```ghi \ XYbhg'a i gh'Uh'U```h]a \ Yg'gi \ Va \]hh\ Y]f'ck b'k \ cf_'Zcf'UggYgga \ Ybh''Gi \ Va \]hh\ ci h'WYUf'mUW_bck `YX[]b['h\ Y'gci fW''cZVcffck YX'a UhYf]U``cf']XYUg']g \ d`U[]Uf]ga "$

5```UggYgga Ybhg`k\]W\`mci `\UbX`]b`a i gh\Uj Y`U`<u>B cb`D`U[]Uf]ga '8YWUfUhjcb`7 cj Yf`G\YYh</u>''`H\]g`]g`Zcf Vch\`]bX]j]Xi U``UbX`[fci d`k cf_"'5htUW\`]hhc`mci f`Ugg][ba Ybh\VYZcfY`gi Va]hhb[']hhc`h\Y`7 ci fgY 7 ccfX]bUhcf`cf`Uhh\Y`GW\cc``C Z]W\''

D`U[]Uf]ga `]g`h\Y`i gY`cZUbch\Yf`dYfgcb'g`k cf_`cf`]XYUg`Ug`]Zh\Ymk YfY`mci f`ck b"`K \Yb`]h]g`bYWfggUfmcf XYg]fUV`Y`hc`i gY`ch\Yf`dYcd`Y'g`a UhYf]U``mci `g\ci `X`UXYei UhY`mUW_bck `YX[Y`k \cgY`k cfXg`cf`]XYUg`h\Ym UfY`UbX`k \YfY`mci `Zci bX`h\Ya `f[]j]b[`h\Y`Wca d`YhY`fYZYfYbWY`XYhU]`gž`]bWi X]b[`dU[Y`bi a VYffg\te"H\Y @YUfb]b[`7 YbhfY`dfcj]XYg`Z fh\Yf`]bZcfa Uh]cb`cb`k \UhWcbgh]hi hYg`D`U[]Uf]ga `Uh \hdg.##qh XYbh'i bgk "YXi "Ui #d`U[]Uf]ga

5 WUXYa]W = DZcfa Uhjcb

7CI FG9'9J5@I 5H€B'5B8'89J9@CDA 9BH

Ghi XYbhZYXVUW_`\Ug`\Y`dYX'hc`g\UdY`UbX`XYj Y`cd`h\]g`Wci fgYž`]bWi X]b[`ZYYXVUW_`cVhJ]bYX`Zfca `cb! `]bY`Yj U`i Uh]cbg`Ug`dUfhcZl BGK 'g`Ug`dUfhcZl BGK 'g`a m9l dYf]YbWi`dfcWigg"`Mci `UfY`\][\`m YbWci fU[YX`hc`Wca d`YhY`gi W\`Ub`cb!`]bY`Yj U`i Uh]cb`hck UfX`h\Y`YbX`cZHYfa "`: YYXVUW_`UbX`gi [[Ygh]cbg dfcj]XYX`k]```VY`]a dcfhUbh`]b`]a dfcj]b[`h\Y`Wci fgY`Zcf`Z hi fY`ghi XYbhg"

•

85H9G'HC'BCH9

 $\label{eq:final_substitution} FYZYf^hc^A ml BGK^Zcf^& dcfhUbh8UhYg^*UjU]^UV^Y^Uh $$ \underline{hdg.\#a n''i bgk "YXi "Ui #ghi XYbh#Ygci fVWg#? Ym8UhYg"\ha` }$

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57589A = 758J = 79

: cf]bZcfa Uh]cb UVci h

- "Bchyg'cb'Uggygga Ybhg'UbX'd'U[]Uf]ga ž
- · · · · GdYWJU` · 7 cbg]XYfUh]cbgž
- "GWXcc"Gh XYbh9h Wg"CZZWYfž"UbX
- 69GG

.

Gi dd'Ya YbhUfm'91 Ua]bUhlcbg.

GiddYa YblUfm91Ua]bUl]cbg'Zcf'HYfa '%&\$&' k]``VY'\Y`X'cb'fH67Eg\ci`X'mci VY'fYei]fYX'lc'g]hcbY"

H\]g`Wci fgY`ci h]bY`gYhg`ci hXYgWf]dh]cb`cZWUggYg`Uhih\Y`XUhY`h\Y`7 ci fgY`Ci h]bY`]g`di V`]g\YX"`H\Y bUhi fY`cZWUggYg`a UmW\Ub[Y`Xi f]b[`h\Y`HYfa `UZhYf`h\Y`7 ci fgY`Ci h]bY`]g`di V`]g\YX"``A ccX`Y`g\ci `X`VY Wcbgi`h\X`Zcf`h\Y`i d`hc`XUhY`WUgg`XYgWf]dh]cbg"``=Zh\YfY`]g`Ubm]bWcbg]ghYbWn]b`h\Y`XYgWf]dh]cb`cZ UWhj]hjYg`VYhk YYb`h\Y`I b]j Yfg]lmiha YhUV`Y`UbX`h\Y`7 ci fgY`Ci h]bY`fUg`i dXUhYX`]b`A ccX`Y\Z`h\Y XYgWf]dh]cb`]b`h\Y`7 ci fgY`Ci h]bY#A ccX`Y`Udd`]Yg"

=a U[Y 7 fYX]h

97; 'k Uj YZcfa 'Zfca '5#DfcZ8c_cgfick b'fYgYUfWX"'7UfX]UW]a U[Y'gci fWYX'Zfca '\hdg.##JZ]V"bYk`]ZYci hcc_ "Wca #\Uh]g!UZ|V!k]h\!fj f#Si ha Sqci fWY1D]bhYfYghYi ha Sa YX]i a 1GcW]UYi ha SWcbhYbh15fh]WYSG\UfY

7F = 7CG

7F = 7CG Dfc|]XYf 7cXY. \$\$\$-,;

5W_bck `YX[Ya YbhcZ7ci bhfm

K Y'UW_bck YX[Y'h\Y'6YXY[U``dYcd`Y'k \c'UfY'h\Y'ffUX]r]cbU``W ghcX]Ubg'cZh\Y``UbXg'cb'k \]W\'I BGK ?Ybg]b[hcb'WJa di g']g'`cWJhYX"

5cdvb\\p\x]b[]b\Yf^Jb\Ytfgf5d\ghf\b]\J\ffP5d\Qhf\pfvZ\gg]vb\J\\9b[]bYYf^7cadYhYb\WmGHJbXUfX

Dfc[fUa '±bhYbXYX'@YUfb]b['CihWca Yg	
?bck `YX[Y'UbX'g_]```VUgY	
D9%'%7cadfY\Ybg]j Yž'h\YcfmVUgYX'i bXYfgHJbX]b['cZh\Y'i bXYfd]bb]b['bUhi fU`'UbXd\mg]WJ`'gWJYbWYg'UbX'h\Y'Yb[]bYYf]b['Z bXUaYbHJ`g'Udd`]WJV`Y'hc'h\Y'Yb[]bYYf]b['X]gWJd`]bY	