

## H\Yfa Y'9fX]b[.'6Y`]YVhYghYf'5i gZ`i [ gn]Y` bUW\BYi gW\k UbghY]b'ØVYf\c`h

8]Y'H\Yfa Y'9fX]b[']gh``Ui h'Y]bYf'I a ZfU[Y'XYf'8NH'Ui Z'D`Uhn - 'XYf'VY`]YVhYghYb'FY]gYn]Y`Y'8Yi hgW\`UbXg"'9]b''9fZc`['ZØf X]Y'FY[]cb''

8]Y'H\Yfa Y'9fX]b['\Uh'g]W\Y]bYb'YI nY``YbhYb'D`Uhn']b'XYf'; i bgh XYf'FY]gYbXYb'[Yg]W\Yfh'i bX'k]fX'U`g'Y]bYg'XYf'VY`]YVhYghYb FY]gYn]Y`Y'8Yi hgW\`UbXg'Ub[YgY\Yb"'9]bY'U\_hi Y``Y'I a ZfU[Yž'X]Y j cb'XYf'8Yi hgW\Yb'NYbhfU`Y'ZØf'Hci f]ga i g'f8NHŁ'Xi fW\[YZØ\fh k i fXYž'nY][hž'XUgg'X]Y'H\Yfa Y'gc[Uf'a Y\f'BUW\ZfU[Y'\Uh'U`g'XUg VYfØ\a hY'GW\`cgg'BYi gW\k UbghY]b"'9fghUi b`]W\Yfk Y]gY'ghY\h'X]Y H\Yfa Y'Ui Z'D`Uhn'- 'XYf'FUb[`]ghYž'i bX'XUg'gW\cb'ni a 'nk Y]hYb A U`']b': c`[Y"

8]YgY'l a ZfU[Yž'Ub'XYf'fi bX'&) "\$\$\$']bhYfbUh]cbU'Y'Bi hnYf hY]`bU\a Ybž'VYk YfhYh'X]Y'Hcd'%\$\$'; YgW\ÀZhYž GY\Ybgk ØfX][\_Y]hYb'i bX'9f`YVb]ggY']b'8Yi hgW\`UbX''8]Y 9f[YVb]ggY'VY`Y[Yb'Y]bXfi W\_gj c``ž'k]Y'gY\f'8Yi hgW\`UbX'ZØf gY]bY': fY]nY]hUb[YVchY'[YgW\Ahnh'k]fX"'5b'XYf'Gd]hnY'XYf FUb[`]ghY'ghY\h'XUg'A]b]Uhi f'K i bXYf`UbX']b'<Ua Vi f[ž'[YZc`[h j ca '9i fcdUdUf\_'Fi gh'i bX'XYa 'D\UbhUg]U`UbX"

## 6YgcbXYfY A Yf\_a U`Y XYf H\Yfa Y 9fX]b[

 $8 ]Y'H Yfa Y \check{z}'X]Y'gY]h'\&) ``\&J YfYb']a ``GØXYb''j cb''9fX]b[ ``YI ]gh]Yfhž n]Y h'`YXYg'`&J YfYhk U'`%ž- ``A ]``]cbYb''6Ygi WXYf'Ub'''8]Yg'nYi [ h'j cb XYf'Ub \ U`hYbXYb''6Y`]YVh\Y]h'i bX'XYf'5hhfU_h]j ]hÀh'XYg'C fhYg'''A ]h ØVYf'`&, ``Fi hgWXYbž'' ) ``GUi bYb''i bX'8 Ua dZVÀXYfb''V]YhYh'X]Y H\Yfa Y'Y]b''bU\Yni 'i bYfgWX OdZ]WXYg'5b[ YVch'Ub 9f\c`i b[ ga O`[`]WX_Y]hYb'''; YgWXÀZhg`Y]hYf'A UfW' g'A U]Yf'nY][ h'g]WX$ 

ghc`n'ØVYf'X]YgY'5i gnY]W\bi b['i bX'a Y]bhž'XUgg'X]Y'Bca ]b]Yfi b[U`g'Y]bn][Y'H\Yfa Y'i bhYf'XYb'Hcd'%\$\$'Y]bY'hc``Y'5bYf\_Ybbi b[ZØf']\f'9b[U[Ya Ybh'gY]"

K Y`ha Y]ghYf`]W `VYgWXfY]Vh'A U]Yf'X]Y`k ]YXYf\c`hY`D`Uhn]Yfi b[]b`XYb`Hcd`%\$"'8]YgY`9ffi b[YbgWXUZh'j Yfk Y]gh'b]WXh'bi f`Ui Z'X]Y Ei U`]hÀh`XYf`9]bf]WXhi b[Ybž'gcbXYfb`Ui WX`Ui Z'X]Y`ghYh][Y K Y]hYfYbhk]W\_`i b[`i bX`5bdUggi b[`Ub`X]Y`K ØbgWXY`XYf'; ÀghY"8Ug`5b[YVch'i a ZUggh'Y]b`VfY]hYg`GdY\_hfi a 'j cb``i l i f]ÒgYb 9bhgdUbbi b[ga Ò[`]WX\_Y]hYb`V]g`\]b`ni `Ui ZfY[YbXYb K UggYffi hgWXYbž'k Ug`Yg`ni f`]XYU`Yb`8Ygh]bUh]cb`ZØf`: Ua ]`]Ybž DUUfY`i bX`9]bnY`fY]gYbXY`a UWXh"

8]Y'H\Yfa Y'9fX]b['\Uh'g]W\'b]W\h'bi f'U`g'N]Y``ZØf'9f\c`i b['i bX 9bhgdUbbi b['YhUV`]Yfhž'gcbXYfb'Ui W\'U`g'Cfhž'XYf'5VYbhYi Yf'i bX : fY]nY]hgdU» 'j Yfgdf]W\h'''Jcb'gW\bY``Yb'K UggYffi hgW\Yb'V]g'\]b'ni fi \][Yb'6YfY]W\Yb'ZØf'K Y``bYgg'i bX'9bhgdUbbi b[']gh'U``Yg j YfhfYhYbž'k Ug'XUg'<Yfn'VY[Y\fh"

## 6YXYi hi b[ 'XYf'l a ZfU[ Y

8]YgY'l a ZfU[Y'dfÀgYbh]Yfh'b]Wkh'bi f'X]Y']bX]j ]Xi Y``Yb
DfÀZYfYbnYb'XYf'FY]gYbXYbž'gcbXYfb'VY`Yi WkhYh'Ui Wkž'k]Y
: fY]nY]hUb[YVchY']b'8Yi hgWk`UbX']bhYfbUh]cbU``k U\f[Ybca a Yb
k YfXYb"'8]Y'H\Yfa Y'9fX]b['U`g'JcfnY][YcV'Y\_h'nY][hž'XUgg
: fY]nY]hdUf\_g'i bX'H\Yfa Yb'Ui Z[fi bX']\fYf'j ]Y`gY]h][Yb'5b[YVchY
i bX'9f`YVb]ggY']a 'HfYbX'`]Y[Yb"'8]Yg'\_ObbhY'ni 'Y]bYf'j YfghÀf\_hYb
#bj Ygh]h]cb']b'gc`WkY'CfhY'ZØ\fYbž'i a 'X]Y'K YhhVYk YfVgZÀ\][\_Y]h
ni 'Yf\U`hYb'i bX'ni 'ZÔfXYfb"

8]Y 'HUhgUW Yž XUgg X]Y 'H\Yfa Y ']b 'Y]bYf 'gc `W Y 'fUb[\c\YbDcg]h]cb ']ghž \_ObbhY 'ni XYa 'Ui Z'Y]bYb '[YbYfY``Yb 'HfYbX\]bXYi hYbž VY] 'XYa '9bhgdUbbi b['i bX 'K Y``bYgg ']a a Yf 'a Y\f ']a J cfXYf[fi bX 'ghY\Yb" '8]Y ': fY]nY]h[YghU`hi b[']a 'Y][YbYb '@UbX[Yk]bbh'ni bY\a YbX 'Ub '6YXYi hi b[ž XU 'A YbgW Yb 'bUW A O[`]W \_Y]hYb 'gi W Ybž XYa 'U``hÀ[`]W Yb 'GhfYgg 'ni 'YbhZ]Y\Yb"

9]b k Y]hYfYg VYa Yf\_Ybgk YfhYg 8 YhU]``]gh X]Y 6 YUW hi b[ 'j cb

9f\c`i b[gY]bf]W\hi b[Yb']b'FUb\_]b[gžX]Y'bcfa U`Yfk Y]gY
GY\Ybgk ØfX][\_Y]hYb'cXYf'\]ghcf]gW\Y'GhÀhhYb'VY]b\U`hYb"'8]Yg
\_\ObbhY'XUfUi Z'\]bXYi hYbž'XUgg'FY]gYbXY'ni bY\a YbX'bUW\
9f`YVb]ggYb'gi W\Ybž'X]Y'gck c\``GdU» 'U`g'Ui W\'9bhgdUbbi b[V]YhYb"

8]Y'H\Yfa Y'9fX]b[']gh'a Y\f'U`g'bi f'Y]bY': fY]nY]hY]bf]W\hi b[/'g]Y]gh'Y]b'Gd]Y[Y`V]`X'XYf'K ØbgW\Y'j cb'FY]gYbXYbž'X]Y'bUW\'Y]bYfUi g[Yk c[YbYb'?ca V]bUh]cb'Ui g'5VYbhYi Yf'i bX'Fi \Y'gi W\Yb"'=bNY]hYbž']b'XYbYb'GhfYgg'i bX'<Y\_h]\_'ni bY\a Ybž'nY][Yb'gc`W\Yla ZfU[Ybž'XUgg'XYf'A YbgW\'X]Y'6U`UbW'nk]gW\Yb'GdU\' i bX

## 9]b '6`]W\_ ']b 'X]Y 'Ni \_i b Zh

A ]h'X]YgYf'D`Uhn]Yfi b['k]fX'X]Y'H\Yfa Y'9fX]b['k c\``Ui W\']b
Ni \_i bZh']a ': c\_i g'XYf': fY]nY]h[YghU`hi b['ghY\Yb"'8]Y
5i gnY]W\bi b['U`g'Y]bYg'XYf'VYghYb'FY]gYn]Y`Y'nY][hž'XUgg

♣j Ygh]h]cbYb']b'9bhgdUbbi b[g!'i bX': fY]nY]hUb[YVchY'Ui Z
Zfi W\hVUfYb'6cXYb'ZU``Yb'i bX'YbhgdfYW\YbXY'6Y[Y]ghYfi b[
gW\UZZYb"'9g'V`Y]Vh'UVni k UfhYbž'k]Y'g]W\XYf'A Uf\_h'Ybhk]W\_Y`b
k]fX'i bX'k Y`W\Y'bYi Yb'HfYbXg'g]W\']b'XYf': fY]nY]h[YghU`hi b[
UVnY]W\bYb'k YfXYb"

8]Y`Fc``Y`XYf`H\Yfa Y`9fX]b[`]a `Hcif]ga i g

8]Y'H\Yfa Y'9fX]b['\Uh'g]W\'U`g'Y]b'VYXYi hYbXYg'9`Ya Ybh'XYg
XYi hgW\Yb'Hci f]ga i ggY\_hcfg'YhUV`]Yfh"'=b'XYb'`YhnhYb'\*J\fYb
k i fXY'XYf'K Y``bYgg!'i bX': fY]nY]ha Uf\_h'ni bY\a YbX'k ]W\h][Yfž'XU
A YbgW\Yb'bUW\'A O[`]W\\_Y]hYb'gi W\Ybž'g]W\'ni 'YbhgdUbbYb'i bX
ni 'fY[YbYf]YfYb"'8]Y'H\Yfa Yž'X]Y'ZØf']\fY'J]Y`ZU`h'Ub'5hhfU\_h]cbYb
VY\_Ubbh']ghž'n]Y\h'gck c\``bUh]cbU`Y'U`g'Ui W\']bhYfbUh]cbU`Y
6Yqi W\Yf'Ub'i bX'hfÀ[h'Yf\YV`]W\'ni f'fY[]cbU`Yb'K ]fhgW\UZh'VY]"'

6YgcbXYfg'k À\fYbX'XYf': Yf]YbnY]hYb'i bX'Ub'K cW.YbYbXYb j YfnY]W\bYh'X]Y'H\Yfa Y'9fX]b['Y]bYb'5bgh]Y['XYf 6Ygi W\YfnU\`Ybž'k Ug'b]W\h'bi f'ZØf'X]Y'9]bf]W\hi b['gY`Vghž gcbXYfb'Ui W\'ZØf'i a `]Y[YbXY'<chY`gž'FYghUi fUbhg'i bX

 $9]bnY`\ \grave{a}bX`Yf`dcg]h]j\ Y`k\ ]fhgW\&\ UZh`]W\&\ Y`5i\ gk\ ]f_i\ b[\ Yb`\ Uh"`8\ ]Y\\ HUhgUW\&\ Y\check{z}`XUgg`X]Y`H\Yfa\ Y`]b`Y]bYf`I\ a\ ZfU[\ Y`i\ bhYf`XYb`Hcd`%$\\ XYf`VY`]YVhYghYb`5i\ gZi\ [\ gn]Y`Y`]b`8Yi\ hgW&`UbX`Y]b[\ Yghi\ Zh`k\ i\ fXYž\ i\ bhYfghfY]W&h`]\ fY`Fc``Y`U`g`hci\ f]gh]gW&Yg`<][\`][\ h`]b`6UmYfb`i\ bX\ j\ YfghAf_h`X]Y`G]W&hVUf_Y]h`XYf`FY[\]cb"$ 

6Ygi WXYfghUh]gh]\_i bX'9]bZi gg'XYf'DUbXYa ]Y

 $\label{eq:continuous_continuous$ 

=a '>J\f'&\$&&'VY[Ubb'Y]bY'`Ub[gUa Y'FØW\_\_Y\f'ni f'Bcfa U`]hÀhž kcVY]'X]Y'6Ygi W\YfnU\`Yb'k]YXYf'Ubgh]Y[Yb"'@Ui h'Y]bYf'I a ZfU[Y XYg'GhUh]gh]gW\Yb'6i bXYgUa hYg'Ui g'XYa '>J\f'&\$&' '\UVYb'\*\$I XYf'6YZfU[hYb'Ub[Y[YVYbž'XUgg'g]Y'd`Ubhž']b'XYb'bÀW\ghYb''%& AcbUhYb'Y]bY'H\Yfa Y'cXYf'Y]bYb'K Y``bYggVYfY]W\'ni 'VYgi W\Yb" 8]YgY'8UhYb'nY][Yb'XUg'k]YXYf\_Y\fYbXY' =bhYfYggY'Ub; Ygi bX\Y]hg!'i bX'9f\c`i b[gY]bf]W\'hi b[Ybž'k Ug'ZØf'X]Y'H\Yfa Y 9fX]b['Y]b'dcg]h]j Yg'NY]W\Yb']gh"

 $Ni _i bZhgUi gV^)W_i bX^9bhk ]W_i b[ghYbXYbnYb]$ 

±0.5 b V Y h f U W h i X Y g i H f Y b X g i ni i Y ] b Y a i ] a a Y f [ Y g i b X \ Y ] h g V Y k i g g h Y f Y b i @ Y V Y b g g h ] i k ] f X i X ] Y i H \ Y f a Y i 9 f X ] b [ k Y ] h Y f \ ] b i ] \ f Y i 5 b [ Y V c h Y i Y f k Y ] h Y f b ži a i X Y b i 6 Y X Ø f Z b ] g g Y b i Y ] b Y f V f Y ] h Y b i N ] Y i [ f i d d Y i [ Y f Y W h i ni i k Y f X Y b i 8 ] Y g i \_ O b b h Y i ni g À h n i ] W Y K Y i b Y g g! D f c [ f U a a Y ž b U W \ U i h] [ Y i D f U \_ h] \_ Y b i b X i Y ] b Y i y f g h A f \_ h Y 8 ] [ ] h U i ] g ] Y f i b [ i X Y f i 8 ] Y b g h Y ] g h i b [ Y b i a Z U g g Y b ž i a i X Y b i? ca Z c f h X Y f i; A g h Y i ni i Y f \ O \ Y b i |

 $\label{label} I a `\_cb\_i ffYbnZA`][ `ni `V`Y]VYbžYj U`i ]Yfh`X]Y`H\Yfa Y`ghAbX][ `X]Y bYi YghYb`9bhk ]W_`i b[ Yb`]a `: fY]nY]h!`i bX`K Y``bYggVYfY]W\"`9]bY k ]W\h][ Y`< YfUi gZcfXYfi b[ `k ]fX`gY]bž`]bbcj Uh]j Y`?cbnYdhY`ni Ybhk ]W_Y`bž`X]Y`gck c\``Y]bYa `VfY]hYb`Di V`]_i a `[ YfYW\h`k YfXYb U`g`Ui W\`X]Y`5bZcfXYfi b[ Yb`Ub`I a k Y`hZfYi bX`]W\_Y]h`i bX BUW\\U`h][ _Y]h`VYfØW_g]W\h][ Yb"$ 

: Øf`k Y]hYfY`±bZcfa Uh]cbYb`ni `Hcif]ga i g`i bX`5hhfU\_h]cbYb`]b 8Yi hgWX`UbXž'VYgi WXYb`G]Y`X]Y`<mark>8Yi hgWXY`NYbhfU`Y`Z</mark>Øf Hcif]ga i g"

8 Y hU1`a

6 Y gi W Y b 'G ] Y 'i b g 'U i Z 'b ! U [ "X Y