

GU`n[]hhYf. Dc`]nY] Yfa]hhY`h'bUWX [YZÀ\f`]WXYf'5i gY]bUbXYfgYhni b['a]h'*\$ DYfgcbYb

GU`n[]hhYf'fbhgŁ

± XYf B UW h'j ca '%- "'5i [i gh'&\$&('YfY][bYhY 'g]W ']b 'GU`n[]hhYf Y]b 'VYgcf[b]gYffY[YbXYf 'J cfZU``ž'XYf 'gW bY```ni 'Y]bYf'; YZÀ\fXi b[XYf 'ÒZZYbh']W Yb 'G]W Yf\Y]h 'ZØ\fhY "'6Y] 'Y]bYf 'a Ugg]j Yb 5i gY]bUbXYfgYhni b[ž'Ub 'XYf 'fi bX'* \$ 'DYfgcbYb 'VYhY]`][h'k UfYbž g]bX'X]Y '6YUa hYb 'XYf 'Dc`]nY] 'bi b '[YZcfXYfhž'X]Y '<]bhYf[fØbXY i bX'a Ò[`]WXY 'ghfUZfYW h`]WXY '5gdY_hY 'ni '_`ÀfYb"

9fa]hh`i b[Yb'XYf'Dc`]nY]

8]Y'Dc`]nY]'\Uh'i bj YfnØ[`]W\'9fa]hh`i b[Yb'Y]b[Y`Y]hYhž'i a \YfUi gni Z]bXYbž'k Y`W\Y'I fgUW\Yb'ni 'X]YgYf'[Yk U`hgUa Yb 5i gY]bUbXYfgYhni b['ZØ\fhYb"'6]g\Yf'g]bX'X]Y'[YbUi Yb <]bhYf[fØbXY'bcW\iib_`Uf'i bX'X]Y'6YUa hYb'a ØggYb'_`ÀfYbž'cV
g]W\'X]Y'?cbZ]_hY'Ui g'JcfZ\`Yb']b'XYf'JYf[Ub[Yb\Y]h
Ybhk]W_Y`hYb'cXYf'cV'Yg'g]W\'i a 'Y]bYb'Y]ba U`][Yb', VYf[f]ZZ
\UbXY`hY"'5b'X]YgYf'GhY``Y'_ÒbbhY'g]W\'Ui W\'X]Y':fU[Y'ghY``Ybž'cV
X]Y'6YhY]`][hYb']b']f[YbXY]bYf':cfa 'a]hY]bUbXYf'VY_Ubbh'k UfYb"</pre>

8 Yf" (!^À\f][Y A Ubbž'XYf'X]Y hÀh`]W\Y 5 i gY]bUbXYfgYhni b[
Ui g[Y`Ògh`\UVYb gc``ž'k Uf'ni 'XYa 'NY]hdi b_h'ghUf_'U`_c\c`]g]Yfh"
8]Yg'`Àggh'j Yfa i hYbž'XUgg'XYf'9]bZi gg'j cb'5`_c\c`
a Ò[`]W\Yfk Y]gY'Y]bY'Fc``Y'VY]'XYf'9bhghY\i b['XYg'?cbZ]_hg
[Ygd]Y`h'\Uh"'9]bY'6`i hdfcVY'k i fXY'Ybhbca a Ybž'i a 'XYb'; fUX
XYf'5`_c\c`]g]Yfi b['[YbUi 'ni 'VYgh]a a Yb"'8Yf'6YgW\i `X][hY
k i fXY'ni f'8]YbghghY``Y'[YVfUW\hž'k c'k Y]hYfY'fYW\h`]W\Y'GW\f]hhY
Y]b[Y`Y]hYh'k YfXYb"

$8]YFYU_h]cbYbXYfDc`]nY]VY\OfXYb$

I a 'X]Y'G]hi Uh]cb'i bhYf'?cbhfc``Y'ni 'Vf]b[Ybž'k i fXY'Y]b; fc» Ui Z[YVch'Ub'Dc`]n]ghYb']b'XYb'9]bgUhnfUi a 'YbhgUbXh"'8 Ub_]\fYf'gW\bY``Yb'<UbX`i b[Yb'_cbbhY'X]Y'@U[Y'VYfi\][h'k YfXYbžVYj cf'g]W\'k Y]hYfY'j Yf`YhnhY'DYfgcbYb'\ÀhhYb'Yf[YVYb'_ObbYb"@Ui h'XYb'Dc`]nY]VYUa hYb'k Uf'Y]b'gW\bY``Yg'9]b[fY]ZYb'bchk YbX][žia'ni'j Yf\]bXYfbž'XUgg'XYg'k Y]hYfY'5[[fYgg]cbYb'Ui g[Y`OghkifXYb"

8]Y'Dc`]nY]``Àggh'_Y]b'F]g]_c'Ui Z'g]W\'g]hnYb'i bX'j YfZc`[h'YXYGdi fž'X]Y'ni f'5i Z_`Àfi b['XYf'5i gY]bUbXYfgYhni b['VY]hfU[Yb_ObbhY"8]Y'`c_U`Y'; Ya Y]bgW\UZh'k]fX'ØVYf'X]Y': cfhgW\f]hhY']bXYb'9fa]hh`i b[Yb']bZcfa]Yfhž'i a 'HfUbgdUfYbn'ni '[Yk À\f`Y]ghYbi bX'XUg'JYfhfUi Yb']b'X]Y'G]W\Yf\Y]hq_fÀZhY'Ui ZfYW\hni Yf\U`hYb"

Ÿ\b`]W\Y`JcfZÀ``Y`]b`j Yf[Ub[YbYb`K cW\Yb`\UVYb`nY][Ybž'k]Y k]W\h]['Yg`]ghž'DfÀj Ybh]cbga U» bU\a Yb`ni 'Yf[fY]ZYb"'8]Y`Dc`]nY] k]fX`XU\Yf`Ui W\; YgdfÀW\Y`a]h`XYf`; Ya Y]bgW\UZh`UbghfYVYbži a dchYbn]Y``Y`?cbZ]_hY`]b`XYf`Ni _i bZh`ni 'j Yfa Y]XYb`i bX`Y]b g]W\YfYg`I a ZY`X`ni 'gW\UZZYb"

2 ZZY b h`] W Y G] W Y f \ Y] h] a : c_i g

 $\label{eq:continuous_continuous$

9gʻ]ghʻk]W\h][ž'XUggʻX]YʻDc`]nY]ʻk Y]hYf\]bʻdfcU_h]jʻa]hʻXYb
6Øf[Yfbʻ_ca a i b]n]Yfhži a ʻŸb[ghYʻUVni VUi Ybʻi bXʻY]bʻ; YZØ\`
XYfʻ; Ya Y]bgW\UZhʻni ʻZÒfXYfb"'<]YfVY]ʻgd]Y`Yb

\$\delta Zcfa Uh]cbgj YfUbghU`hi b[Ybʻi bXʻ[Ya Y]bgUa Yʻ\dangle]h]Uh]j YbʻY]bY
nYbhfU`YʻFc``Y"

8] Y 'Dc`]nY] '] b 'GU`n[] hhYf'\Uh'g] W 'ni f'5 i Z[UVY '[Ya UW hž'X] Y I fgUW Yb 'j cb'; Yk U`h'ni 'YfZcfgW Yb'i bX'X] Y '2 ZZYbh`] W _Y] h'] b X] YgYb 'DfcnYgg'Y] bni VYn] Y\Yb" '8] Yg'_ObbhY'U`g'dfÀj Ybh] j Y A U» bU\a Y'[Y[Yb'ni _ØbZh][Y'À\b`] W Y'J cfZÀ``Y'X] YbYb"

8YhU]`g`ni f`5i gY]bUbXYfgYhni b[

8]Y 5i gY]bUbXYfgYhni b[žX]Y g]W]b XYf

<U[YbghfU» Y#K YffUghfU» Y]b GU`n[]hhYf'YfY][bYhYž'ZUbX']b XYf

BUW\h'ni a '%- "5i [i gh'&\$&('ghUhh'i bX'nc['gW\bY``Y]bY'[fc» Y

A YbgW\Yba Yb[Y'Ub"] VYf'X]Y <]bhYf[fØbXY']gh'bcW\'k Yb][

VY_Ubbhž'UVYf'6Yf]W\hYb'ni Zc`[Y'gc``Y]b GhfY]h'i bhYf'a Y\fYfYb

DYfgcbYb XYf'5i g`ÒgYf'[Yk YgYb'gY]b"'9g']gh'Ui ZZÀ``][ž'XUgg']a

Ni gUa a Yb\Ub['a]h'XYa 'JcfZU```j]Y`Y'HY]`bY\a Yf

GW\`U[k Yf_nYi [Y'i bX'A YggYf'a]hZØ\fhYbž'k Ug'X]Y

; Yk U`hVYfY]hgW\UZh'XYi h`]W\`Yf\Ò\h'

8]Y'Dc`]nY]'Yf\]Y`h'nU\`fY]W\Y'Bchfi ZYžX]Y'Ui Z'Y]bY'W\Uch]gW\Y G]hi Uh]cb'\]bk]YgYb"'=b'X]YgYa '?cbhYl h'k UfYb'X]Y'9]bgUhn_fÀZhY gW\bY``'j cf'Cfh'i bX'_cbbhYb'XUb_']\fYf'DfÀgYbn'Y]bY'k Y]hYfY 9g_U`Uh]cb'j Yf\]bXYfb"'8]Yg'\YVh'X]Y'6YXYi hi b['Y]bYg'[i h cf[Ub]g]YfhYb'Dc`]nY]!'i bX'G]W\Yf\Y]hggmghYa g']b'ghÀXh]gW\Yb ; YV]YhYb'\Yfi cf"

; YgYhn`]WXYFU\a YbVYX]b[i b[Yb`]b 8Yi hgWX`UbX

±0.8 Yi hgWX`UbX`[Y`hYb`ghfYb[Y`; YgYhnY`\]bg]WXh`]WX`XYg`6Yg]hnYg i bX`XYg`9]bgUhnYgʻj cb`K UZZYbžY]bgWX`]Y»`]WX`A YggYfbʻi bX
GWX`U[k Yf_nYi [Yb"\8 UgʻK UZZYb[YgYhn`fK UZZ; Ł`fY[Y`h`XYb
La [Ub[`a]h`[YZÀ\f`]WXYb`; Y[YbghÀbXYb"\8 Yf`9]bgUhn`j cb
K UZZYb`]b`Y]bYf`5i gY]bUbXYfgYhni b[`_Ubb`gWXk Yfk]Y[YbXY
fYWXh`]WXY`?cbgYei YbnYbžY]bgWX`]Y»`]WX``Ub[Yf`<UZhghfUZYbž'bUWX
g]WX`n]Y\Yb"'=a `: U```XYf`?ÒfdYfj Yf`Yhni b[ž'k]Y`g]Y`]b`GU`n[]hhYf
[YgWXY\Yb']ghž'Xfc\Yb`XYb`6YgWXi`X][hYb`Y`bUWX`GWXk YfY`XYf
HUh`i bX`XYb`I a ghÀbXYb`XYg`9]bnY`ZU``gʻj YfgWX]YXYbY
GhfUZfU\aYb"

6Y] [YZÀ\f`]WXYf'? ÒfdYfj Yf`Yhni b[ž'X]Y`\]Yf'a Ò[`]WXYfk Y]gY'ni f 5bk YbXi b['_ca a hž'g]bX'X]Y'GhfUZYb'XYi h`]WX'\ÀfhYfž'VYgcbXYfg k Ybb'Y]b'A YggYf'j Yfk YbXYh'k i fXY"'8]Yg'_ÒbbhY'Ui Z'Y]bY'\c\Y GhfUZY'ZØf'XYb'' (!À\f][Yb'\]bk Y]gYbž'ni a U`'X]Y'U`_c\c`VYX]b[hY 6YY]bZi ggi b['U`g'YfgWXk YfYbX'Ub[YgY\Yb'k YfXYb'_Ubb"

2 ZZY b h`]WX Y 'K U\fbY\a i b['i b X G]WX Y f\Y]hgUgdY_hY

JcfZÀ``Y`k]Y`X]YgYf`kYfZYb`: fU[Yb`ni f`G]W\Yf\Y]h`]b`ghÀXh]gW\Yb; YV]YhYb`Ui Z"=b`XYb``YhnhYb`>J\fYb`[UV`Yg`]a aYf`k]YXYf
6Yf]W\hY`ØVYf`A\b`]W\Y`5i gY]bUbXYfgYhni b[Ybž`X]Y`cZh`]a
Ni gUa aYb\Ub[`a]h; fc>jYfUbghU`hi b[Yb`cXYf`UbXYfYb
[YgY``][Yb`HfYZZYb`ghY\Yb"`G]W\Yf\Y]hgYl dYfhYb`i bX`ghÀXh]gW\Y
6Y\ÒfXYb`X]g_i h]YfYb`j YfghÀf_h`ØVYf`dfÀj Ybh]jY`AU>bU\aYbži a
[YkU`hhÀh][Y`5i gY]bUbXYfgYhni b[Yb`ni jYfa Y]XYb`i bX`XUg
G]W\Yf\Y]hg[YZØ\``XYf`6Øf[Yf`ni ghÀf_Yb"`<]YfVY]`gd]Y`h`b]W\h`bi f
X]Y`Dc`]nY]dfÀgYbnž`gcbXYfb`Ui W\XX]Y`5i Z_`Afi b[gUfVY]h`]b
GW\i`Yb`i bX; YaY]bXYb`Y]bY`k]W\h][Y`Fc``Y"

Ni gàhn`]WX []Vh'Yg']a a Yf'k]YXYf'±0]h]Uh]j Yb'j cb n]j]`[YgY``gWXUZh`]WXYb'5_hYi fYbž'X]Y'g]WX'ZØf'; Yk U`hdfàj Ybh]cb i bX'X]Y'8YYg_U`Uh]cb'j cb'?cbZ]_hYb'Y]bgYhnYb"'8]YgY Dfc[fUa a Y'g]bX'cZh'XUfUi Z'Ui g[Yf]W\hYhz'X]Y'?ca a i b]_Uh]cbg! i bX'?cbZ`]_h`Ògi b[gZÀ\][_Y]hYb'j cb''1 b[Yb'A YbgW\Yb'ni j YfVYggYfb"

Fc``Y'XYf'Dc`]nY]'i bX'ni _ØbZh][Y 9fa]hh`i b[Yb

8]Y'Dc`]nY]'\Uh'bUW\'Y]bYa 'JcfZU```X]YgYf'5fh'X]Y'JYfUbhk cfhi b[žia ZUggYbXY'9fa]hhìi b[Yb'Y]bni `Y]hYb"BYVYb'XYf': YghghY``i b[XYf'X]fY_hYb'6YhY]`][hYb'a ØggYb'Ui W\'NYi [Yb'VYZfU[h'i bX'X]Y[YbUi Yb'I a ghÀbXY'[Y_`Afh'k YfXYb"'8]Y'5i gk Yfhi b['j cbJ]XYcØVYfk UW\i b[Yb'i bX'X]Y'5bU`mgY'j cb'6Yk Y]gYb'j cf'Cfh'g]bXYbhgW\Y]XYbXY'9`Ya YbhYži a 'X]Y'; YgW\Y\b]ggYbUW\nij c``n]Y\Yb'i bX'JYfUbhk cfh`]W\Y'ni f'FYW\YbgW\UZh'ni n]Y\Yb"

8]Y '9f[YVb]ggY 'X]YgYf '9fa]hhìi b[Yb'_ObbhYb'k Y]hfY]WXYbXY
: c`[Yb'ZØf'X]Y '6YhY]`][hYb'\UVYbž']bgVYgcbXYfY 'ZØf'XYb
'(!'À\f][Yb'A Ubbž'XYf'g]WX 'bi b'j cf'Y]bYa '; Yf]WXh'j YfUbhk cfhYb
a i gg"'8]Y '5fh'i bX'K Y]gYž'k]Y 'X]Y 'Dc`]nY]'a]h'gc`WXYb'G]hi Uh]cbYb
i a [Y\hž'k]fX'Ui WX'X]Y'_ØbZh][Y'6Yn]Y\i b['nk]gWXYb'XYf'Dc`]nY]
i bX'XYf'; Ya Y]bgWXUZh'VYY]bZi ggYb"

.

8 YhU]`q

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