

; ch\U`V`Ø\h. ; Ya Y]bgUa `ZØf`Y]bY
[fØbYfY`Ni _i bZh`XYf`GhUXh

; ch\U`ZØfXYfh'a]h' 6Äi a Y`ZØf'; ch\U `U_hj] `XYb
GhUXhVUi a VYghUbX''9fZU\fyb`G]Yžk]Y`6Øf[Yf'i bX
I bhYfbY\`a Yb`ni f`6Y[fØbi b[`VY]hfU[Yb"

8 Ug`9b[U[Ya Ybh`XYf`6Øf[Yf]bbYb`i bX`6Øf[Yf`j cb` ; ch\U`ni f
9fk Y]hYfi b[`XYg`GhUXhVUi a VYghUbXYg`b]a a`hghYh][`ni žk Ug`]b
XYf`bYi YghYb`DfYggYa]hY]i b[`XYf`GhUXhj Yfk U`hi b[`VYgcbXYfg
\Yfj cf[Y\cVYb`k]fX''8]Y ; fØbZ`ÄW`Yb`i bX`6Äi a Y`gd]Y`Yb`Y]bY
YbhgW`Y]XYbXY`F c``Y`ZØf`XUg`gh`ÄXh]gW`Y`A]_fc_]a Už`XYbb`g]Y`g]bX
b]W`h`bi f`Ägh\Yh]gW`Ub`gd`fY`W`Yb`Xž`gcb`XYfb`Yf`ZØ``Yb`Ui`W
nU\`fY]W`Y`k]W`h][Y : i b_h]cbYb``G]Y``]YZYfb`G`W`U`h`Y`bž`j YfVYggYfb
X]Y`@ Zhe i U`]h`Ä`hi bX`hfU[Yb`ni f`K`UggYfgdY]W`Yfi b[`VY]"

⇒ `Gca a Yf`&\$%-`k i fXY`XUg`6Ui a gdYbXYbdfc`Y_h` 6Äi a Y`ZØf
; ch\U `]bg`@VYb`[Yfi ZYbž`i a `XYb`A`YbgW`Yb`XUg`6Yk i gghgY]b
ZØf`X]Y`6YXYi hi b[`j cb`6Äi a Yb`]b`gh`ÄXh]gW`Yb`F`Äi a Yb
b`Ä\Yfni Vf]b[Yb''8]YgYg`Ub`gd`fY`W`Yb`XY`Dfc`Y_h`Yfa`Ø[`]W`h`Yg
`YXYa ž`Y]bYb`6Ui a `Ui`gni`k`Ä`\Yb`i bX`Z]b`Ubn]Y``ni`i`bhYfgh`Ø`hnYb"
⇒ bhYfYgg]YfhY`Z]bXYb`Ui`Z`XYf`K`YVg]hY`XYf`GhUXhj Yfk U`hi b[`Y]bY
6Ui a _UfhYž`Ui`Z`XYf`g]Y`]\fyb`K`i`bgW`VUi a `Ui`gk`Ä`\Yb`_`ÖbbYb"
8Yf` ; YgUa`hVYhfU[`ZØf`Y]bYb`6Ui a `VY`Äi`Zh`g]W`Ui`Z`%"`\$\$`9i`fc`ž
k`cVY]`Ui`W`HY]`VYhf`Ä[Y`U_nYdh]Yfh`k`YfXYb''8]YgY`Gi`a`a`Y
VY]b\U`h`h`b]W`h`bi`f`Y]bYb`]b`Y]bYf`6Ui a`gW`i`Y`[Yk`UW`gYbYb
6Ui a`ž`gcb`XYfb`Ui`W`X]Y`DZY[Y`k`Ä`\fyb`X`XYg`YfghYb`↵\fyg`i`bX
X]Y`9bhk`]W`_i`b[`gdZY[Y`ØVYf`nk`Y]`↵\fy"

K`UW`gYbXYf`9fZc`[`XYg`Dfc`Y_hg

8 Ug`Dfc`Y_h`ghUfhYhY`a`]h`Y]bYf`YfZc`[`fY]W`Yb`DZ`Ubn`U_h]cb`j`cb

g]YVYb'6Äi a Yb'ja 'YfghYb'À\ f"GY]hXYa '\UVYb'g]W\ ØVYf'&\$\$
GdYbXYfžXUfi bhYf'Df]j UhdYfgcbYbžJ YfY]bY'i bX'l bhYfbY\ a Ybž
Z]bUbn]Y''Ub'XYa 'J cf\UVYb'VYhY'] [h"J]Y'Y'A YbgWYb'bi hnYb'X]Y
; Y'Y[Yb\Y]hž'i a 'VY]gd]Y'gk Y]gY'; YVi fhghU[g[YgWYb_Y']b': cfa
j cb'6Ui a gdYbXYb'ni 'j YfgWYb_Yb'cXYf'Y]bZUW\ ']\fYb'6Y]hfU['ni
Y]bYa ' [fØbYfYb'; ch\U'ni ''Y]ghYb"Ni gUa a Yb'\UVYb'X]Y
GdYbXYb'j]b'XYb''YhnhYb'ZØbZ'À\ fYb'Y]bYb'VYa Yf_Ybgk YfhYb
6YhfU['j cb']bg[YgUa h'+(") &\$'9i fc'Yfn]Y'h"8Ua]h'_cbbhYb
nk]gWYb'&\$%- 'i bX'&\$&' 'VYfY]hg') ' 'bYi Y'6Äi a Y' [YdZUbnh
k YfXYb"

8]Y'6YfY]hgW\ UZh'ni f'GdYbXY'nY][h'g]W\ 'Ui W\ 'j]b'XYf
_cbh]bi]Yf'W\ Yb'l bhYfghØhni b['XYg'Dfc'Y_hg"Gc'k]fX'Yfk UfhYhž
XUgg]a 'Bcj Ya VYf'X]YgYg'À\ fYgžXUb_'XYf' [YbcggYbgW\ UZh]W\ Yb
5bgfhYb[i b[Yb'j]Y'Yf'; ch\UYf'gck]Y''c_U'Yf':]fa Yb'i bX'J YfY]bYž
bYi b'k Y]hYfY'6Äi a Y'ja 'GhUXh[YV]Yh[YdZUbnh'k YfXYb'_ØbbYb"
8]YgY' [Ya Y]bgW\ UZh]W\ Y' ð]h]Uh]j Y'j YfXYi h]W\ h'XUg'ghUf_Y
ðhYfYggY'XYf'6Yj Ò'_Yfi b['Ub'Y]bYa ''VYbX][Yb'i bX' [fØbYb
l a Z'X"

B Yi Y'A Ò[']W\ _Y]hYb'ni f'A]h[YghU'hi b [

æa 'FU\ a Yb'XYg'Dfc'Y_hg'd'Ubh'X]Y'GhUXh] Yfk U'hi b[ž'bcW\ 'j]b
X]YgYa 'À\ f'ni gÄhn]W\ Y'GhUbXcfhY'Ui ZXYf'6Ui a _UfhY
Ui gni k Ä\ Yb"8]Yg'gc''XYb'GdYbXYf]bbYb'i bX'GdYbXYfb'X]Y
A Ò[']W\ _Y]h'V]YhYbž'Y]bYb'dUggYbXYb'i bX'UbgdFYW\ YbXYb'D'Uhn
ZØf'\fYb'6Ui a 'ni 'Z]bXYb"8Ug'9b[U[Ya Ybh'ZØf'B Uhi f'i bX
l a k Y'h'k]fX'Xi fW\ 'gc'W\ Y'Dfc'Y_hY' [YghÄf_h'i bX'nY][hž'k]Y''c_U'
ni gUa a Yb[YUfVY]hY'h'k YfXYb'_Ubbž'i a 'XUg'GhUXhV]'X'bUW\ \U'h][
ni 'j YfÄbXYfb"

8Ug'GdYbXYbdfc'Y_h'i'6Äi a Y'ZØf'; ch\U']gh'b]W\ h'bi f'Y]bY
6YfY]W\ Yfi b['ZØf'XUg'GhUXhV]'Xž'gcbXYfb'Ui W\ 'Y]b'NY]W\ Yb'XUZØfž
k]Y'k]W\ h['XUg'6Yk i gghgY]b'ZØf'l a k Y'h'i bX'B Uhi fgW\ i hn'j]b'XYf
\Yi h][Yb'NY]h]gh"8Ug'ghUf_Y'9b[U[Ya Ybh'j cb'6Øf[Yf]bbYbž
6Øf[Yfb'i bX'l bhYfbY\ a Yb'ni f'l bhYfghØhni b['X]YgYf'ð]h]Uh]j Y
ghY''h'g]W\ YfžXUgg'; ch\U'Ui W\ 'ni _ØbZh]['Y]b' [fØbYf'C fh'V'Y]Vhž'Ub
XYa 'B Uhi f'i bX'l fVUb]hÄh'\Ufa cb]gW\ 'a]hY]bUbXYf'j YfVi bXYb

g]bX"

B UW\ U`h][Yf`6Y]hfU[`ni f`ghAXh]gW\ Yb
9bhk]W_`i b[

8Yf`9fZc`[`j cb` 6Ai a Y`Z0f`; ch\U`]gh`Y]b`DUfUXYVY]gd]Y`XUZ0fž
k]Y`60f[YfYb[U[Ya Ybh`i bX`_ca a i bU`Y`ϕ]h]Uh]j Yb
ni gUa a Ybk]f_Yb`_0bbYbž`i a `VYXYi hYbXY`J YfAbXYfi b[Yb
\YfVY]ni Z0\fyb"8i fW`X]Y`[Ya Y]bgW\UZh`]W\Y`5bgfhYb[i b[`k]fX
b]W\h`bi f`X]Y`@YVYbgei U`]h`h`b`XYf`GhUXh] YfVYggYfhž`gcbXYfb
Ui W`Y]b`6Y]hfU[`ni f`6Y`_Aa dZ` b[`j cb`l a k Y`hd`fcV`Ya Yb`k]Y
@` Zh] YfgW\ a i hni b[`i bX`<]hnY]bgY`b`[Y`Y]ghYh"9]b`[f0bYfYg
; ch\U`VYXYi hYh`Y]b`bUW\U`h][`YVYb`gk YfhYg`l a ZY`X`Z0f`U`Yž
Y]bY`6chgW\UZhž`X]Y`X]Y`GhUXh] Yfk U`hi b[`a]h`]\fYa
6Ui a gdYbXYbdfc`Y`_h`Y]bXfi W_gj c``i bhYfa Ui Yfh"

8]Y`GhUXh`; ch\U`\Uh`Xi fW`XUg`6Ui a gdYbXYbdfc`Y`_h`b]W\h`bi f
Y]bYb`[f0» YfYb`GhUXhVUi a VYghUbX`YffY]W\hž`gcbXYfb`Ui W`XUg
6Yk i gghgY]b`XYf`6Yj 0`_Yfi b[`Z0f`l a k Y`h`i`i bX`BUhi fgW\i hn
[YgW\`AfZi"ϕ`YXYf`ghAXh]gW\Yb`l a [YVi b[`gd]Y`Yb`6Ai a Y`Y]bY
YggYbh]Y`Y`F c`Y"G]Y`hfU[Yb`ni f`J YfVYggYfi b[`XYf`@` Zhe`i U`]h`h`
VY]ž`]bXYa`g]Y`GW\UXghcZZY`UVgc`fV]YfYb`i bX`GUi Yfghc`Z
dfcXi n]YfYb"9]b`Y]bnY`bYf`[fc» Yf`6Ui a `_Ubb`dfc`ϕ\`f`V]g`ni`%) \$
?]`c[fUa a `?c`Ybghc`ZZ]cl]X`Ui ZbY`a Ybž`k Ug`Y]bYb
VYXYi hYbXYb`6Y]hfU[`ni a`?`]a UgW\i hn`Y]ghYh"K Y]hYfY
ϕZcfa Uh]cbYb`0VYf`X]Y`0`c`c[]gW\Yb`J c`fhY]`Y`j cb`6Ai a Yb`Z]bXYb
g]W\`Ui ZXYb`K YVgY]hYb`j cb`C`f[Ub]gUh]cbYb`k]Y`XYa`6i bX`Z0f`
l a k Y`h`i bX`BUhi fgW\i hn`8Yi hgW\`UbX`Y"J`"

8 Ug; UfhYbUa h]b`; ch\U`j YfZc`[`hia]h`X]YgYa`Dfc`Y`_h`Ui W`X`Yb
5bgUhn`XYf`60f[YfVYhY]`][i b["8]Y`9]bVYn]Y\i b[`XYf`0ZZYbh`]W\Yb
; Ya Y]bgW\UZh`Z0fXYfh`b]W\h`bi f`X]Y`ϕYbh]Z]_Uh]cb`XYf`60f[Yf`a]h
]\fYf`GhUXhž`gcbXYfb`gW\UZh`Ui W`Y]b`6Yk i gghgY]b`Z0f`X]Y
B`ch`k YbX][`_Y]hž`X]Y`l a k Y`h`U`_h]j`ni`[YghU`hYb`i bX`ni`gW\0hnYb`
8]Yg`dUggh]b`Y]b`[f0» YfYg`[YgY`gW\UZh`]W\Yg`6Ya 0\Ybž
ghAXh]gW\Y`F`Ai a Y`[f0bYf`i bX`YVYb`gk YfhYf`ni`[YghU`hYb`
K Y`h`k Y]h`[]Vh`Yg`A`b`]W\Y`ϕ]h]Uh]j Ybž`X]Y`nY][Ybž`k]Y
; Ya Y]bgW\UZhYb`Xi fW`XUg`DZUb`nYb`j cb`6Ai a Yb`gcn]U`Yb

Ni gUa a Yb\U`hi bX`l a k Y`hVYk i gghgY]b`ZØfXYfb`_ØbbYb"

8 Yf`9]bZ`i gg`j cb`GhUXhV`Ai a Yb`Ui Z`XUg
?`]a U

6`Ai a Y`]b`gh`AXh]gW`Yb` ; YV]YhYb`\UVYb`b]W`h`bi f`A`gh`Yh]gW`Y
J c`fhY]`Y`ž`gcbXYfb`gd]Y`Yb`Ui W`X`Y]b`Y`nYbhfU`Y`F`c`Y`VY]`XYf
FY[i`]Yfi b[`XYg`GhUXh`_]a Ug"@Ui h`Y]b`Yf`Ghi X]Y`XYg`8`Yi`hgW`Yb
K`Y`hhYfX]Yb`ghYg`_ØbbYb`6`Ai a Y`X]Y`HYa dYfUhi fYb`]b`Gh`AXhYb
i a `V]g`ni`)` ; fUX`7`Y`g]i g`UVgYb`_Yb`"8`i fW`X`Yb`G`W`U`h`Y`b`i b`X`X]Y
J`YfXi bghi b[`j`cb`K`UggYf`hfU[Yb`g]Y`ni f`5`V`Ø`_`i`b[`Ub`_`Y]»Yb
Gca a YfhU[Yb`VY]"8]Yg`]gh`VYgcbXYfg`k`]W`h][`ž`XU`<]mYk`Y`Yb`]b
i fVUbYb` ; YV]YhYb`\`Ai Z[`]b`hYbg]j`Ui g[YdfA[h`g]bX`"Gh`AXhY`a`]h
Y]bYf`\c`Yb`6`Ui a X]W`hY`nY][Yb`dcg]h] Y`9`ZY`_`hY`Ui Z`X]Y
; Ygi bX`Y]h`XYf`6`Yk`c`b`Yf`ž`XU`X]Y`6`Y`Ughi b[Yb`Xi fW`
@`Zhj`YfgW`a`i`hni b[`i`b`X`Yi`hfYa`Y`HYa`dYfUhi`fYb`[`Ya`]b`XYfh
k`YfXYb"

Ni g`Ah`n`]W`h`fU[Yb`6`Ai a Y`ni f`F`Y`Xi`n]Yfi b[`j`cb
FY[Ybk UggYfUVZi gg`VY]"8`i fW`X`]`fY`K`i`fnY`b`_ØbbYb`g]Y`[`fc`»`Y
A`Yb[Yb`K`UggYf`gdY]W`Yfb`i`b`X`gca`]h`X]Y`6`Y`Ughi b[`XYf
gh`AXh]gW`Yb`9`b`hk`A`ggYfi b[ggmg`hYa`Y`k`A`f`Yb`X`ghUf`_Yf`FY[Yb`Z`A`Y`Y
j`Yff]b[Yfb`"8]Yg`]gh`Y]b`Yf`YV`]W`Yf`J`c`fhY]`ž`XU`i`fVUbYg` ; fØb`ni`f
A`]b`XYfi b[`j`cb` ; VYfgW`k`Ya`a`i`b[gf]g]_Yb`VY]hfA[h"

8]Y`F`c`Y`X`Yf`GdYbXYb`ZØf`b`UW`X`U`h][`Y
GhUXhYb`hk`]W`_`i`b[

8 Ug`6`Ui a gdYbXYbdfc`Y`_`h]b` ; ch`U`]gh`Y]b`6`Y]gd]Y`ZØf
bUW`X`U`h][Y`GhUXhYb`hk`]W`_`i`b[ž`X]Y`Xi`fW`X`]b`Ub`n]Y`Y
l`bhYfghØ`hni b[`XYf`6`Øf[Yf`fYU`]g]Yfh`k`]fX`"8]YgY`5`fh`XYf
:]b`Ub`n]Yfi b[`hfA[h`X`Uni`VY]ž`XUgg`Gh`AXhY`Y]b`Yb`HY]`]\`fYf
?`fYU]h]j`h`A`h`Ui`W`X`Y`Z`X]Y`6`Y[fØbi b[`i`b`X`X]Y`G`W`U`Zi`b[`U`h`f`U`_`h]j`Yf
@`VYb`g`f`Ai`a`Y`Ui`g`XY`\`b`Yb`_ØbbYb`"Ghi`X]Yb`\UVYb`[`YnY][`hž`XUgg
=]j`Ygh]h]cbYb`]b`gh`AXh]gW`Y` ; fØb`Z`A`W`Yb`X]Y`@`VYb`gei`U`]h`A`h`XYf
5`bk`c`\`b`Yf`Yf`\Ø`Yb`_ØbbYb`"@Ui`h`Y]b`Yf`l`a`Z`fU[Y`j`cb`Gh`U]gh`U
[`YVYb`+)`i`XYf`6`Y`Z`fU[`hYb`Ub`ž`XUgg`g]Y`Yg`g`W`A`h`Y`b`ž`]b`Y]b`Ya

GhUXh[YV]Yhia]hj]Y`Yb`6Ai a Yb`i bX`; fØbZÅWYb`ni ``YVYb"

8 Ug`9b[U[Ya Ybh`XYf`; ch\UYf`6Øf[Yf`nY][hž`k]Y
[Ya Y]bgWUZh]WYf`9]bgUhn`ni f`J YfVYggYfi b[`XYf`I a k Y`h
VY]hfU[Yb`_Ubb" `Gc`WY`b]h]Uhj] Yb`_ØbbYb`b]WYh`bi f`ni f
5i ZghcW_i b[`XYg`GhUXh[fØbg`ZØ\ fYbž`gcbXYfb`Ui W`XUg`gcn]U`Y
A]hY]bUbXYf`i bX`X]Y`⇒Ybh]Z]_Uh]cb`XYf`A YbgWYb`a]h`]\fYf
B UWVUfgWUZh`ghÅf`_Yb"

8 YhU]`g

6Ygi WYb`G]Y`i bg`Ui Z.`b!U["XY