

J Yf_Y\fgW\ Ucg]a 'A U]b!?']bn][!? fY]g.
I bZU``ghUh]gh]_`gc f[h'ZØf`6Ygc f[b]g

I bZÄ``Y`]b`C ZZYbVUW\.`F chYf`Dc`c`ZÄ\fh`]b` ; Y[Ybj Yf_Y\ fž
HfU_hcf`ØVYffc``h`@UbXk]fhž`&' !Ä\ f][Yf`j Yf`Ynh`VY]
5``Y]bi bZU``"

⊕`Y]bYf`GYf]Y`j`cb`gW\cW_]YfYbXYb`J Yf_Y\fgi bZÄ``Yb`]b`XYf
FY[]cb`<UbUi`i`bX`XYa`'A U]b!?']bn][!? fY]g` \UVYb`g]W\`a`Y\ fYfY
J cfZÄ``Y`YfY][bYhž`X]Y`gck`c`\`X]Y`Dc`]nY]`U`g`Ui`W\`X]Y`5bk`c`bYf
Ui`Z[YgW\ fYW_h`\ UVYb``8]YgY`9fY][b]ggY`fY]W\Yb`j`cb
i`bj`YfUbhk`cfh]W\Ya` : U\ fj`Yf\ U`hYb`]b`XYf`GhUXh`V]g`\]b`ni
gW\k`YfYb`i`bZÄ``Yb`a`]h`UbXk]fhgW\UZh]W\Yb` : U\fnYi [Yb`]b
`ÄbX`]W\Yb` ; YV]YhYb``8UVY]`k`i`fXYb`b]W\h`bi`f`GUW\gW\ÄXYb
j`Yfi`fgW\hž`gcbXYfb`Ui`W\`A`YbgW\Yb`j`Yf`Ynhž`k`Ug`X]Y
8f]b[`]W_Y]h]j`cb`J Yf_Y\fgg]W\Yf\Y]h]b`XYb` : c`_i`g`fØW_h"

6YgcbXYfg`Ui`ZÄ``][`k`Uf`Y]b`J`cfZU``Ua`'A`]hk`c`W\ž`XYa`'%(`"
5i [i ghž`U`g`Y]b`fchYf`J`K`'Dc`c`Ui`Z`XYf`6i`bXYgghfU»`Y`)`&%]b
F]W\hi`b[`B]XXYfUi`'a`Y\ fZUW\`]b`XYb` ; Y[Ybj Yf_Y\ f`Z` \f``NYi [Yb
VYf]W\hYhYb`j`cb`XYf`[YZÄ\ f`]W\Yb` : U\fk`Y]gY`XYf`` +!`Ä\ f][Yb
: U\ fYf]bž`X]Y`Ui`W\`X]Y`GW\i`md`Ub`_Yb`Ub`Y]bYf`HUb`_ghY``Y
hci`W\]YfhY``C`V`k`c`\`X]Y`Dc`]nY]`gW\`bY``fYU[]YfhY`i`bX`X]Y` : U\ fYf]b
ghcddhYž`j`Yf`]YZb`gck`c`\`XYf`5hYa`U`_c`c`!`U`g`Ui`W\`XYf
8fc[Ybj`cfhYgh`bY[Uh]j` ``8]Y`Dc`]nY]`gi`W\h`bi`b`bUW\`k`Y]hYfYb
NYi [Ybž`X]Y`a`Ø[`]W\Yfk`Y]gY`XUg`f]g`_Ub`hY`J`Yf\ U`hYb`XYf` : U\ fYf]b
VYcVUW\hYh`\ UVYb``8]Yg`nY][h`X]Y`B`chk`YbX][_Y]hž
j`YfUbhk`cfhi`b[gVYk`i`gghYf`ni`ZU\ fYb`i`bX`UbXYfY
J Yf_Y\fgH]`bY\`a`Yf`ni`fYgdY_h]YfYb"

I bZÄ``Y`a`]h`hfU[]gW\Yb` : c`[Yb

9]b`k Y]hYfYf`YfgWk fYW_YbXYf`J cfZU``YfY][bYhY`g]Wk`]b`XYf
; Ya Y]bXY` ; f0bXUi ž`k c`Y]b`* &!`Å\`f][Yf`@UbXk`]fhgWk`Yf`j`Yf`Yhnh
k i fXYž`U`g`Yf`j`cb`gY]bYa`Y][YbYb`HfU`hcf`YfZUggh`k i fXY`"8Yf
l bZU``YfY][bYhY`g]Wk`k`Å\`fYbX`Yf`Ua`A`]h`k c`Wk`j`cfa`]hU[`Y]bY
K`]YgY`]a`F`cbbYVi`f[Yf`K`Y[`a`Å\`Yb`k`c``hY`"K`Å\`fYbX`Yf`]b`X]Y
: U\`fYf`_UV]bY`Y]bghY][Yb`k`c``hYž`fc``hY`XYf`HfU`hcf`a`]h`5b`Å`b[Yf
Ui`g`i`b`_UfYb` ; f0bXYb`f0W`k`Å`fhg`i`bX`0VYffc``hY`]`b`"8Yf
@UbXk`]fh`a`i`gghY`a`]h`gWk`YfYb`J`Yf`Yhni`b[Yb`]bg`?`fUb`_Yb`U`i`g
[YZc[Yb`k`YfXYbž`k`Ug`X]Y` ; YZU\`fYb`VY]`UbXk`]fhgWk`UZh`]Wk`Yb
5fVY]hYb`j`YfUb`gWk`Ui`]Wk`h`@UbXk`]fhgWk`UZh`]Wk`Y`HÅh][`_Y]hYb
VYf[Yb`b]Wk`h`bi`f`F`]g]_Yb`Xi`fWk`A`UgWk`]bYb`ž`gcbXYfb`ZcfXYfb`Ui`Wk
Y]bY`gh`Å`bX][Y`5i`Za`Yf_gUa`_Y]hž`i`a`i`l`bZ`Å``Y`ni`j`Yfa`Y]XYb`"

9]b`k Y]hYfYf`gWk`YfYf`l`bZU``YfY][bYhY`g]Wk`Ua`gY`VYb`HU[`[`Y[Yb
`" \$`l` \`f`Ui`ZXYf`6i`bXYgUi`hcVU\`b``*`ž`U`g`Y]b`&!`Å\`f][Yf`G`_cXU!
: U\`fYf`X]Y`?`cb`hfc``Y`0VYf`gY]bYb`K`U[Yb`j`Yf`cf`i`bX`]b`Y]bY
6Ui`ghY``Y`_fUWk`hY`"8UXi`fWk`k`i`fXYb`HY]`Y`XYf`6Y`hc`b`Y]hk`Å`bXY`]b
XYb` ; Y[Yb]`Yf`_Y\`f`[YgWk`cVYb`"5i`Wk`\]Yf`k`Uf`XUg`F`Ygi`h`Uh`Y]b
GWk`Yfj`Yf`YhnhYfž`XYf`ni`f`a`YX]n]b]gWk`Yb`6Y`U`bX`i`b[]`b`Y]b
?`fUb`_Yb`U`i`g`Y]b[Y`]YZf`h`k`YfXYb`a`i`gghY`"8]Y`J`Yf`_Y\`fgdc`nY]
\`Uh`VYfY][hg`X]Y`9fa`]h`i`b[Yb`Ui`Z[Ybca`a`Yb`i`bX`gi`Wk`h`NYi`[Ybž
i`a`X]Y[YbUi`Yb`5V`Åi`ZY`XYg`l`bZU`g`ni`_`Å`fYb`"Gc`Wk`Y`J`cfZ`Å`Y
j`YfXYi`h]Wk`Ybž`k`]Y`k`]Wk`h][`Yg`]ghž`X]Y`J`Yf`_Y\`fgj`c`fgWk`f]ZhYb`ghf`_h
ni`VYZc`[Yb`i`bX`5V`Yb`_i`b[Yb`ni`j`Yfa`Y]XYb`"

K`Y]hYfY`J`Yf`_Y\`f`gi`bZ`Å``Y`]b`XYf`F`Y`[`]`cb`

Ni`g`Å`h`i`Wk`[UV`Yg`Y]bY`l`bZU``Zi`Wk`h`Ui`ZY]bYa`DUf`_d`Uhn`]b`<`UbUi`ž
k`c`Y]b`[fUi`Yf`C`dY``7`cfgU`VYgWk`Å`X][`h`k`i`fXY`"9]b`i`bVY`_Ubb`hYf
: U\`fYf`j`Yfi`fgUWk`hY`Y]bYb`GWk`UXYb`j`cb`Yhk`U`%"\$\$\$`9i`fcž`]bXYa
Yf`VY]a`9]b!`cXYf`5i`gdUf`_Yb`a`]h`XYa`7`cfgU`ni`gUa`a`Ybgh]Y`»`i`bX
UbgWk`]Y`»`YbX`XYb`l`bZU``cf`h`j`Yf`]Y`»`"8]Y`Dc`]nY]`V]h`h`h`i`a
<]bk`Y]gY`Ui`g`XYf`^2`ZZYb`h`]Wk`_Y]hž`i`a`XYb`J`YfUb`hk`cf`h`]Wk`Yb
Ui`gZ]bX][`ni`a`UWk`Yb`"8Yf`J`cfZU``k`]fZh`: fU[Yb`ni`f`G]Wk`Yf`\`Y]h`Ui`Z
DUf`_d`Å`h`Yb`Ui`Zi`bX`ni`f`J`YfUb`hk`cf`h`i`b[ž`X]Y`: U\`fYf`]b`gc`Wk`Yb
G]h`i`Uh]cbYb`\`UVYb`"

⇒`XYf`C`h`c!`<`U\`b!`G`h`f`U`»`Y`k`i`fXY`Y]bY`DUggUb`h]b`j`Yf`Yhnhž`b`UWk`XYa`

g]Y`]b`Y]bYb`J Yf_Y\fgi bZU``a]hY]bYa `g]VYfbYb`Yd`j Yfk]W_Y`h
k Uf``5i W` \]Yf`gi W`h`X]Y`Dc`nY]`bUW`NYi [YbžX]Y`XYb`J cfZU``
VYcVUW`hYh`UVYb``8]YgYf`J cfZU``nY][h`X]Y`6YXYi hi b [`j cb
J cf]g]W`hi bX`F ØW_g]W`hbU`a Y`ja `GhfU» Ybj Yf_Y`fž`j cf`U``Ya `]b
6YfY]W`Yb`a]h`j]Y``: i » [Åb[Yfj Yf_Y`f`

F c``Y`XYf`6Y\ ÒfXYb`i bX DfÅj Ybh]cbga U» bU`a Yb

5b[Yg]W`hg`X]YgYf`j YfgW`]YXYbYb`J cfZÅ``Y`]gh`X]Y`F c``Y`XYf`Dc`nY]
i bX`XYf`Òfh]W`Yb`6Y\ ÒfXYb`j cb`[fc» Yf`6YXYi hi b [``8]Y`Dc`nY]
\Uh`b]W`h`bi f`X]Y`J YfU`bhk cf`hi b[ž`X]Y`J Yf_Y`fgfY[Y`b
Xi fW`ni gYhnYbž`gcbXYfb`g]Y`Yb[U[]Yfh`g]W`Ui W`U`_hj` `]b`XYf
DfÅj Ybh]cbgUfVY]h`9]b`6Y]gd]Y``\]YfZØf`g]bX`X]Y`6]_Yf!GUZYhm!
Hci fYb`ž`X]Y`ja `GYdhYa VYf`&\$&(`Xi fW`[YZØ`fh`k YfXYbž`i a
A chcfUUXZU`fYfb`k]W`h][Y`G]W`Yf`Y]hgUgdY`_hY`bÅ`Yfni Vf]b[Yb`

9g]gh`i bYf`Ågg`]W`ž`U``Y`J Yf_Y`fghY]`bY`a Yf`ni `gYbg]V`]g]YfYb
i bX`XUfUi Z`\]bni k Y]gYbž`k]Y`k]W`h][`Yg`]ghž`[YZÅ`f`]W`Y
J Yf`U`hYbgk Y]gYb`ni `j Yfa Y]XYb`i bX`Ui Z`X]Y`G]W`Yf`Y]h`ja
GhfU» Ybj Yf_Y`f`ni `UW`hYb``8]Y`_cbh]bi]Yf`]W`Y`5i Z`_Åfi b[`i bX
, VYfk UW`i b[`_ØbbYb`XUni `VY]hfU[Ybž`X]Y`NU`XYf`i bZÅ``Y
Yf`YV`]W`ni `fYXi n]YfYb`i bX`X]Y`G]W`Yf`Y]h`U``Yf`6YhY`]][hYb`ni
[Yk Å`f`Y]ghYb`

< Åi Z][_Y]h`j cb`J Yf_Y`fgi bZÅ``Yb`]b 8 Yi hgW``UbX

⊕8Yi hgW``UbX`g]bX`J Yf_Y`fgi bZÅ``Y`Y]b`YfbghYg`DfcV`Ya`ž`XUg
Å`f`]W`ni `nU`fY]W`Yb`J Yf`YhnhYb`i bX`HcXYgZÅ``Yb`ZØ`fh`@Ui h
XYa`GhUh]gh]gW`Yb`6i bXYgUa`hi [UV`Yg]ja``U`f`&\$&&ØVYf`&ž`*
A]``cbYb`dc`nY]`]W`YfZUgghY`J Yf_Y`fgi bZÅ``Y``8]YgY`i bZÅ``Y
fYgi `h]YfhYb`]b`a Y`f`U`g`' %("\$\$\$`J Yf`YhnhYb`i bX`&`- *)
HcXYgcdZYfb``6YgcbXYfg`Ui ZZÅ``][`]gh`X]Y`Ni bU`a Y`XYf
J Yf_Y`fgi bZÅ``Y`Ui Z`@UbXghfU» Ybž`X]Y`cZh`a]h`f]g`_UbhYb
: U`fj Yf`U`hYb`i bX`i bni fY]W`YbXYb`G]W`Yf`Y]hgj cf_Y`fi b[Yb`]b
J YfV]bXi b[` [YVfUW`h`k YfXYb`

9]b'g][b]Z_UbhYf'HY]'X]YgYf'I bZÄ''Y'_Ubb'Ui Z: U\fZY\`Yf'i bX
5`_c\c`!'cXYf'8fc[Yba]ggVfUi W`ni fØW_[YZØ\fh'k YfXYb"'6Y]
5`_c\c`ZU\fhYb`'Y[h'X]Y'; YZU\fYbei chY''Ui h'Y]bYf'Ghi X]Y'XYg
8Yi hgW\Yb'J Yf_Y\fgg]W\Yf\Y]hgfUhYg'fBJ F Ł'Yf\YV`]W\`Ø\Yfž
k cVY]: U\Yf'f'a]h'Y]bYa '6'i hU`_c\c`[Y\U'hj cb'\$ž) 'Dfca]''Y'Y]b
i a 'XUg'&ž)!ZUW\Y\`Ø\YfYg'F]g]_c`\UVYbž]b'Y]bYb'I bZU`
j Yfk]W_Y'hini 'k YfXYb"'8Yf'Ui Za Yf_gUa Y'I a [Ub['a]h'gc`W\Yb
H\Ya Yb'ghj cb'YbhgW\Y]XYbXYf'6YXYi hi b['ZØf'X]Y'G]W\Yf\Y]h
U`Yf'J Yf_Y\fgg]bY\ a Yf"

J Yf_Y\fgg]W\Yf\Y]h'i bX DfÄj Ybh]cbga U» bU\ a Yb

I a 'X]Y'J Yf_Y\fgg]W\Yf\Y]h'ini 'Yf\`Ø\Ybž'\UVYb`nU\`fY]W\Y
Cf[Ub]gUh]cbYb'i bX'6Y\`ØfXYb'j YfgW]YXYbY
DfÄj Ybh]cbga U» bU\ a Yb'ja d'Ya Ybh]Yfh"'8Uni '[Y\`ØfYb'X]Y
8i fW ZØ\fi b['j cb'J Yf_Y\fgg]W\Yf\Y]hg_Ua dU[bYbž'X]Y'GW i 'i b[
j cb': U\YfYb'i bX'gdYn]Y''[YghU`hYhY
J Yf_Y\fgg]W\Yf\Y]hgd'fc[fUa a Y'k]Y'X]Y' 6]_Yf!GUZYhm!Hci fYb
XYg'Dc`nY]dfÄg]X]i a g'GØXcgh\YggYb"'8]YgY'Dfc[fUa a Y'n]Y`Yb
XUfUi Z'UVž'XUg'6Yk i gghY]b'ZØf'g]W\YfYg': U\fj Yf\U'hYb'ni
gW`ÄfZYb'i bX'X]Y': Ä\][_Y]hYb'XYf'HY]'bY\ a Yf'ni 'j YfVYggYfb"

9]b'k Y]hYfYf'k]W\h][Yf'5gdY_h'XYf'J Yf_Y\fgg]W\Yf\Y]h'gh'X]Y
?cbhfc`Y'j cb': U\fnYi [Yb"'FY[Y'a Ä»][Y
G]W\Yf\Y]hgØVYfd'fØZ b[Yb'i bX'hYW\ b]gW\Y'`b'gdY_h]cbYb'g]bX
YbhgW\Y]XYbXž'i a 'a YW Ub]gW\Y'DfcV'Ya Y'ni 'j Yfa Y]XYbž'X]Y'ni
I bZÄ''Yb'ZØ\fYb'_ØbbhYb"'@Ui h'Y]bYf'I a ZFU[Y'XYf'; YgY''gW UZh'ZØf
HYW\ b]gW\Y', VYfk UW i b['fl H, Ł'\UVYb'&) 'i 'XYf': U\fnYi [\U'hYf
'\fY'5i hcg]b'XYb'YhnhYb'nk Y]'U\`fYb'b]W\h'ni a 'H, J '[YVfUW\hž
k Ug'XUg'F]g]_c'j cb'I bZÄ''Yb'Yf\`Ø\h"

I a 'X]Y'G]W\Yf\Y]h'Ui Z'XYb'GhfU» Yb'k Y]hYf'ni 'j YfVYggYfbž']gh'Y]bY
Yb[Y'Ni gUa a YbUfVY]h'nk]gW\Yb'Dc`nY]ž
J Yf_Y\fgg]W\Yf\Y]hgc'f[Ub]gUh]cbYb'i bX'XYf'6Yj Ø`_Yfi b[
YfZcfXYf'W"'Bi f'Xi fW\`Y]b['Ya Y]bgUa Yg'9b[U[Ya Ybh'_Ubb'X]Y
NU\`XYf'J Yf_Y\fgi bZÄ''Y'i bX'XYf'XUa]h'j YfVi bXYbYb
J Yf'Yhni b[Yb'i bX'HcXYgZÄ''Y'g][b]Z_Ubh'fYXi n]Yfh'k YfXYb"

8 Yf`k]fhgWk UZh`]Wk Y`i bX`gc n]U`Y`? cbhYI hj cb J Yf_Y`fgi bZÄ`Yb

J Yf_Y`fgi bZÄ`Y` \UVYb`b]Wk h`bi f`h`X`]Wk Y`5i gk]f_i b[Yb`Ui Z
9]bnY`dYfgcbYbž`g]Y` j Yfi fgUWk Yb`Ui Wk`Yf`YV`]Wk Y`k]fhgWk UZh`]Wk Y
?cghYb`ZØf`X]Y` ; YgY`gWk UZh`"GWk Ähni b[Yb`ni Zc`[Y`VY`Ui ZYb`g]Wk
X]Y`Ä`f`]Wk Yb`?cghYb`Ui Z[fi bX`j cb`J Yf_Y`fgi bZÄ`Yb`]b
8Yi hgWk`UbX`Ui Z`a Y`fYfY`A`]`]UfXYb`9i fc`"8]YgY`?cghYb`gYhnYb
g]Wk`Ui g`a YX]n]b]gWk Yb`6Y`UbX`i b[g_cghYbž
DfcXi`_hj]hÄhgj Yf`i ghYbž`GWk ÄXYb`Ub`fZfUghfi`_hi f`i bX
: U`fnYi [Yb`gck]Y` ; YgYhnYgj c`ni [g_cghYb`ni gUa`a Yb`"

8]Y`k]fhgWk UZh`]Wk Yb` : c`[Yb`j cb`J Yf_Y`fgi bZÄ`Yb`VYhfYZZYb`Ui Wk
X]Y`J Yfg]Wk Yfi b[gdfÄa`]Yb`"GhY][YbXY`I bZU`nU`Yb`_ÖbbYb`ni
\Ö`YfYb`J Yfg]Wk Yfi b[gVY]hfÄ[Yb`ZØ`fYbž`k Ug`g]Wk`bY[Uh]j`Ui Z
X]Y`Z]bUbn]Y`Y`G]hi Uh]cb`j]Y`Yf`<Ui g`U`hY`Ui gk]f`h`"Ni XYa`gd]Y`h
X]Y` ; YgY`gWk UZh`Y]bY`F`c`ž`XU`j]Y`Y`J Yf_Y`fgi bZÄ`Y`Ui Wk`]b
gc n]U`gWk`ÄWk YfYb` ; fi ddYb`Y]bY`Ö`YfY`J YfVfY]hi b[`Ui Zk`Y]gYbž
k Ug`hY]`k`Y]gY`Ui Zk`Yb][Yf`YfZU`fYbY` : U`fYf`cXYf`gWk`YWk`hY
J Yf_Y`fgy]`Xi b[`ni fØW`ni ZØ`fYb`]gh"

⇒a`F`U`a Yb`XYf`DfÄj Ybh]cb`]gh`Y]bY`j YfghÄf`hY`5i Z`Äfi b[`i bX
GYbg]V`]g]Yfi b[`XYf`6Øf[Yf`ZØf`X]Y`F`]g]_Yb`]a`GhfU`»Ybj Yf_Y`f
bch`k`YbX]["Bi`f`Xi`fWk`Y]b`h]YZYfYg`J YfghÄbXb]g`XYf
Ni gUa`a Yb`Äb[Y`nk]gWk Yb`J Yf_Y`fgi bZÄ`Yb`ž`k]fhgWk UZh`]Wk Yb
?cghYb`i bX`dYfgÖb`]Wk Yf`G]Wk Yf`Y]h`_Ubb`Y]b`bUWk`U`h][Yg
6Yk`i`gghgY]b`ZØf`J Yf_Y`fgy]Wk Yf`Y]h`]b`XYf` ; YgY`gWk UZh`YhUV`]Yfh
k`YfXYb`"

8YhU]`g

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