

HY`Y[fUa !7\YZ'DUK Y`8i fck `]b
: fUb_fY]Wk `ZYgh[Ybca a Yb.`9fa]hh`i b[Yb
`Ui ZYb

DUK Y`8i fck ž7\YZj cb`HY`Y[fUa žk i fXY`]b: fUb_fY]Wk
k Y[Yb`; YgYhnYgj YfghŒ» Yb`Ua `: `i [\UZyb`@Y`6ci f[Yh
ZYgh[Ybca a Yb"

5a `GUa ghU[`k i fXY`DUK Y`8i fck žXYf`; fŒbXYf`XYf`A YggYb[Yf!
5dd`HY`Y[fUa ž`Ua `: `i [\UZyb`@Y`6ci f[Yh]b`XYf`B`A`Y`j cb`DUf]g
ZYgh[Ybca a Yb"8Yf" -!`A`f][Yž`XYf`Ui Wk`X]Y`ZfUbnŒg]gWk Y
GhUUhgVŒf[YfgWk UZh`VYg]hnhž`k Uf`ni j cf`Ui g`5gYfVU]XgWk Ub
Ub[YfY]gh`i bX`\Uhh`Y]b`5VYbXYggYb`]b`XYf`ZfUbnŒg]gWk Yb
<Ui dhghUXh`[Yd`Ubh"9fa]hh`Yf`\UhhYb`[Y[Yb`]b`VYfY]hg
9fa]hh`i b[Yb`Y]b[Y`Y]hYhž`X]Y`g]Wk`Ui Za Y`fYfY`; YgYhnYgj YfghŒ» Y
ja `Ni gUa a Yb\Ub[`a]h`gY]bYa `A YggYb[YfX]Ybgh`VYn]Y`Yb"

8]Y`ZfUbnŒg]gWk Yb`6Y\ŒfXYb`k YfZYb`8i fck `j cfž`b]Wk h
Ui gfY]Wk YbX`[Y[Yb`X]Y`J Yfk YbXi b[`j cb`HY`Y[fUa `ZŒf`_f]a]bY`Y
5_hj]]h`hYb`j cfni [Y`Yb"Ni XYa `k]fX`]a `j cf[Yk cfZYbž`b]Wk h`a]h
XYb`9fa]hh`i b[gVY\ŒfXYb`ni `ccdYf]YfYbž`k Ug`X]Y`G]hi Uh]cb`bcWk
_ca d`n]YfhYf`a UWk h"HY`Y[fUa `]gh`]b`XYf`YhnhYb`NY]h`j Yfgh`f`_h]b
XYf`?f]h]_ž`]bgVYgcbXYfY`]b`8Yi hgWk`UbX`i bX`UbXYfYb`@`AbXYfbž
k c`X]Y`D`UhhZcfa `a]h`fYWk hgYI hfYa Yb`; fi ddYb`i bX
J YfgWk k Œfi b[gh`Ycf]Yb`]b`J YfV]bXi b[`[YVfUWk h`k]fX"

HY`Y[fUa `i bX`gY]bY`< YfUi gZcfXYfi b[Yb

8]Y`D`UhhZcfa `k i fXY`&\$%` `j cb`8i fck `i bX`gY]bYa `6fi XYf`B]_c`U]
[Y[fŒbXYhž`bUWk`XYf`9bhk]W`_i b[`XYg`fi gg]gWk Yb`gcn]U`Yb
BYhnk Yf_g`J`_cbhU`hYž`XUg`: UWk Vcc`_`A`bY`h"HY`Y[fUa `V]YhYh`X]Y
A Œ[`]Wk`_Y]hž`7`Uhg`a]h`9bXY!ni !9bXY]J YfgWk`ŒggY`i b[`ni `ZŒ`fYbž

k cXi fW\`X]Y`Df]j Uhgd\`ÄfY`XYf`Bi hnYf`[Yk U\`fh`V`Y]Vh`C V k c\`
X]Yg`Y]b`k`]W\h][Yg`A Yf`_a`U`]ghž`gcf[h`Yg`Ui W\`ZØf`6YXYb`_Ybž`XU
X]Y`g]W\YfY`8 UhYbØVYfhfU[i b[`_]a`]bY`Yb`9`Ya YbhYb`F Ui a
[YVYb`_Ubb"

⇒ a Yf`k`]YXYf`g]Y\`h`g]W\`HY`Y[fUa`_a`]h`?f]h]_`_cbZfcbh]Yfhž`k`Y]`X]Y
D`UhhZcfa`_U`g`F ØW`ni [gcfh`ZØf`Yi hfYa`]gh]gW\Y`5bg]W\hYb`i`bX
J YfgW\k`Øfi`b[gh\`Ycf]Yb`X]Ybh`K`Ä\`fYbX`8i`fck`_VYhc`bž`XUgg
HY`Y[fUa`_g]W\`j`cb`I`G!8]YbghYb`i`bhYfgW\Y]XYhž`X]Y`Bi`hnYfXUhYb
_ca`a`Yfn]Y`j`Yfk`YbXYbž`k`]fX`c`Zi`Ub[YZØ\`fhž`XUgg`a`Ub[Y`bXY
5i`Zg]W\hi`bX`?`cbhfc`Y`XUni`_ZØ\`fYbž`XUgg`_f]a`]bY`Y`5`_hj`]hÄhYb
b]W\h`Ui`gfY]W\YbX`j`YfZc`[h`k`YfXYb`_ØbbYb"

8]Y`J`cfk`ØfZY`[Y[Yb`8i`fck`_g]bX`_Y]b`9]bnY`ZU`K`Y`hk`Y]higY\`Yb
g]W\`6YhfY]VYf`j`cb`_gcn]U`Yb`BYhnc`Yf`_Yb`i`bX`A`YggU[]b[!8]YbghYb
ni`bY\`a`YbXYa`_8fi`W`_Ui`g[YgYhnhž`X]Y`J`YfVfY]hi`b[`j`cb
9i`hfYa`]ga`i`g`i`bX`:`Y\`]bZcfa`Uh]cbYb`]b`]\`fYb`D`UhhZcfa`Yb`ni
j`Yf\`]bXYfb`" `b`X]YgYa`_?`cbhYi`h`ghY`h`X]Y`:`YghbU\`a`Y`j`cb`8i`fck
Y]bYb`VYXYi`hYbXYb`A`ca`Ybh`XUf`"G]Y`_ØbbhY`5i`gk`]f`_i`b[Yb`Ui`Z
XUg`k`Y]hYfY`J`cf[Y\`Yb`j`cb`HY`Y[fUa`_`UVYb`i`bX`a`Ø[`]W\Yfk`Y]gY
XYb`8]U`c[`ØVYf`[YgYh`]W\Y`F`Y[i`_]Yfi`b[`i`bX`J`YfUbnk`cfhi`b[`ZØf
D`UhhZcfa`Yb`bYi`_VY`YVYb"

8i`fck`ž`XYf`bUW\`XYa`_J`Yf`_Ui`Z`j`cb`J`_cbhU`_hY`&\$%(`_Fi`gg`UbX
j`Yf`]Y»`ž`\`Uh]b`_a`Y\`fYfYb`GhÄ`XhYb`k`]Y`6Yf`]bž`@`cbX`cbž`G]b[Udi`f
i`bX`GUb`:`fUbW]gW\`[Y`YVhž`VYj`cf`Yf`gY]bYb`I`bhYfbY\`a`Yb`gg]hn
bUW`8i`VU]j`Yf`Y[hY`"8]Yg`nY][hž`XUgg`XYf`:`YgW\`Ä`ZhgZØ\`fYf`Y]b
i`bhYfbY\`a`Yf]gW\Yg`I`a`ZY`X`gi`W\hž`XUg`]\`a`_Y]bY`[Yk`]ggY`:`fY]\`Y]h
V]YhYhž`Ui`W\`]a`_<`]bV`]W`_Ui`Z`dc`]h]gW\Y`i`bX`fYW\h]W\Y
F`U\`a`YbVYX]b[i`b[Yb"

8]Y`6YXYi`hi`b[`XYf`:`YghbU\`a`Y`

8]Y`:`YghbU\`a`Y`j`cb`DUk`Y`8i`fck`_ØbbhY`k`Y]hfY]W\YbXY
?`cbgYei`YbnYb`ZØf`XYb`A`YggU[]b[!8]Ybghi`HY`Y[fUa`_`UVYb`"
BYVYb`_a`Ø[`]W\Yb`fYW\h]W\Yb`GW\k`]Yf][`_]hYb`]gh`Ui`W\`X]Y
ÖZYb`h]W\Y`K`U\`fbY\`a`i`b[`]b`XYb`VYhfc`ZYbYb`@`AbXYfb`j`cb
6YXYi`hi`b[`CV`HY`Y[fUa`_gY]bY`Ghfi`_hi`fYb`Ä`bXYfb`_a`i`ggž`i`a`_XYb

9fk Ufhi b[Yb`XYf'6Y\ÖfXYb`[YfYWXh'ni`k YfXYbž`V`Y]Vh
UVni k UfhYb"

8]Y': fU[Ybž`X]Y`Ui g`X]YgYf`G]hi Uh]cb`Ui Z[Yk cfZYb`k YfXYbž`\UVYb
XUg`DchYbn]U`ž`X]Y`8]g_i gg]cb`ØVYf`Bi hnYffYWXhYž`8 UhYbgWXi hn
i bX`X]Y`J YfUbhk cfhi b[`j cb`HYWXbc`c[]Yi bhYfbY`a Yb
j cfUbni hfY]VYb" `ϕ`Y]bYf`NY]hž`]b`XYf`X][]hU`Y`?ca a i b]_Uh]cb
YbhgWX]Y]X]YbX`]ghž`k]fX`X]Y`F c`Y`j cb`D`UhhZcfa Yb`k]Y`HY`Y[fUa
ni bY`a YbX`_f]h]gWX`\]bhYfZfU[h`C`V`8i fck`X]Y`J cfk ØfZY
Ybh_f`Ä`Z]Yb`_Ubb`i bX`k Y`WX`Y`A U»bU`a Yb`HY`Y[fUa`_]b`Ni`_i bZh
Yf[fY]ZYb`k]fX`ž`i a`X]Yb`6YXYb`_Yb`XYf`F`Y[]Yfi b[Yb
Ybh[Y[Ybni`_ca a Ybž`V`Y]Vh`c`ZZYb" `9g`V`Y]Vh`UVni k UfhYbž`k]Y
X]YgYf': U``X]Y`6fUbWX`Y`i bX`X]Y`ni [fi bXY``]Y[YbXYb`Df]bn]d]Yb
XYf`D`UhhZcfa`VYY]bZi ggYb`k]fX"

8]Y`fYWX`h]WX`Yb`5i gY]bUbXYfgYhni b[Yb`i a`A YggYb[Yf!8]YbghY
i bX`XYfYb`J YfUbhk cfhi b[`[Y[YbØVYf`XYb`Bi hnYfb`g]bX`b]WX`h
bYi " `ϕ`j]Y`Yb`@ÄbXYfb`[]Vh`Yg`8]g_i gg]cbYb`XUfØVYfž`]bk]Yk Y]h
D`UhhZcfa Yb`ZØf`X]Y`ϕ`U`hYž`X]Y`\fY`Bi hnYf`hY]`Ybž`j YfUbhk cfh]WX
[Ya UWX`h`k YfXYb`_ÖbbYb" `8]Yg`k]fZh[fi bX`Y[YbXY': fU[Yb`ØVYf
X]Y': fY]\Y]h`XYf`A`Y]bi b[gÄi »Yfi b[`i bX`XYb`GW`i`hn`j`cf`<UggfYXY
Ui Z"

ϕ`8Yi hgWX`UbX`VY]gd]Y`gk Y]gY`\Uh`XUg
BYhnk Yf_Xi fWX`gYhni b[g[YgYhn`fBYhn8; Łž`XUg`&\$%, `]b`?fUZ]hfUhž
ni a`N]Y`ž`<UggfYXYb`i bX`UbXYfY`ghfUZVUfY`ϕ`U`hY`]b`gc`n]U`Yb
BYhnk Yf_Yb`Y`ZY`_h]j Yf`ni`VY`_Äa`dZYb" `6YhfY]VYf`gc`n]U`Yf
D`UhhZcfa Yb`g]bX`j YfdZ]WX`hYhž`XYfUfh][Y`ϕ`U`hY`]bbYf`U`V`j`cb`&(G
Ghi bXYb`ni`ÖgWX`Yb`cXYf`ni`gdYffYbž`UbXYfbZU`g`Xfc`Y`b`\c`Y
; Y`XghfUZyb" `HY`Y[fUa`k]fX`\Äi Z[[_f]h]g]Yfhž`k Y]`Yg`g]WX`XYa
9]bXfi W`_Ybhn]Y`hž`gc`WX`Y`ϕ`U`hY`_cbgYei Ybh`ni`_cbhfc``]YfYbž
k cXi fWX`Yg`U`g`g]WX`YfYf`<UZYb`ZØf`Yi hfYa`]gh]gWX`Y`; fi ddYb
Ub[YgY`Yb`k]fX"

8Yf': U``j cb`DUk Y`8i fck`i bX`HY`Y[fUa`i bhYfghfY]WX`h`X]Y
<YfUi gZcfXYfi b[ž`Y]b`; `Y]WX[Yk]WX`h`nk]gWX`Yb`8 UhYbgWXi hn`i bX
XYf`6Y`_Äa`dZi b[`j cb`A]ggVfUi WX`ni`Z]bXYb" `8i fck`g`6Y`U`i`dhi b[ž
X]Y`8 UhYb`XYf`Bi hnYf`ni`gWX`Ø`hnYbž`_ÖbbhY`U`g`5f[i a Ybh`X]YbYbž

i a `]b`Y]bYf`NY]hž`]b`XYf`X][]hU`Y`Df]j Uhg d\`ÅfY`ni bY\`a YbX`i bhYf
8 fi W`_ [Yf`hž`k Y]hYf\`]b`Bi hnYf`Ubni n]Y\`Yb" `8YbbcW`nY][h`X]Y
?f]h]_ž`XUgg`X]YgYf` : c`_i g`Ui W`XUni `Z0\`fYb`_Ubbž`XUgg`GhfUZhUhYb
i bX`Yi hfYa]gh]gW`Y` ð\`U`hY`i b [Y\`]bXYfh]j YfVfY]hYh`k YfXYb"

8]Y `k]fhgW` UZh`]W`Yb `5gdY`_hY`j c b `HY`Y [fUa

HY`Y [fUa ž`XUg`gc`]X`U`g`D`UhhZcfa `Z0f`A YggU []b [`i bX
?ca a i b]_Uh]cb`d`cg]h]cb]Yfh`]ghž`_ÖbbhY`Ui Z [fi bX`j cb`fYW`h`]W`Yb
DfcV`Ya Yb`Y]bY`<YfUi gZcfXYfi b [`Z0f`X]Y`ni _0bZh][Y
A cbYhUf]g]Yfi b [`i bX`XUg`K UW`ghi a `XUfghY`Yb" `K `Å\`fYbX`X]Y
Bi hnYfnU\`Yb`ghYh][`ghY][Ybž`]gh`X]Y : fU [Y`XYf`A cbYhUf]g]Yfi b [
b]W`h`gc`_`Uf`XYZ]b]Yfh" `æ` ; Y [YbgUhm`ni `K YhVYk YfVYfb`k]Y
K \Uhg5ddž`XUg`Y]b` ; YgW`ÅZga cXY`U`UVYž`XUg`]b` ðgYfUHY`cXYf
NU\`i b [gX]YbghY`]bj c`j]Yfh`]ghž`V`Y]Vh`HY`Y [fUa `k Y]h [Y\`YbX
k YfVYZfY]"`

ð`0b [ghYf`NY]h\`Uh`8i fck `YXcW`Ub [Y [YVYbž`XUgg`Yf`Yfk `Å [hž
Y]b][Y` :]bUbn]Yfi b [gghfUhY []Yb`i a ni gYhnYbž`i a `HY`Y [fUa `Ui Z
`Ub [Y`G]W`h`fYb`hUVY`ni `a UW`Yb" `8]Yg`_ÖbbhY`j ca
Bi hnYfZYXVUW`_i bX`j cb`XYa `J YfhfUi Yb`UV\`Åb [Ybž`XUg`X]Y
Bi hnYf`k Y]hYf\`]b`]b`X]Y`D`UhhZcfa `U`UVYbž`VYgcbXYfg`]a `@]W`h`j cb
fYW`h`]W`Yb`<YfUi gZcfXYfi b [Yb"

5 _hi Y`Y`GhUh]gh]_Yb`i bX`Bi hnYfj Yf\`U`hYb

8]Y`Dcdi `Uf]h`Åh`j cb`A YggU []b [!8]YbghYb`\`Uh`]b`XYb`Y`hnhYb
`Å\`fYb`Yf\`YV`]W`ni [Ybca a Yb" `@Ui h`GhUh]ghU`\`UhYb`A YggYb [Yf!
5ddg`]a `Å\`f`&\$\$%&k Y`hk Y]h`Yhk U`&ž+`A]`]UfXYb`Bi hnYf`i bX`X]Y
NU\`ghY][h`k Y]hYf" `HY`Y [fUa `VYf]W`hYhž`XUgg`Yg`0VYf`+\$\$
A]`]cbYb`U`_h]j Y`Bi hnYf`\`Uhž`k Ug`X]Y`F`Y`Yj Ubn`i bX`XUg`DchYbn]U`
XYf`D`UhhZcfa `VY`Y [h" `

A]h` : c`_i g`Ui Z`G]W`Yf\`Y]h`i bX`8UhYbgW`i hn`g]bX`Ui W`j]Y`Y
æi fbU`]ghYbž`5`_h]j]ghYb`i bX`A YbgW`Yb`fYW`h`Yf`Ui Z`HY`Y [fUa
i a [Ygh]Y [Ybž`i a `ðZcfa Uh]cbYb`ni `gUa a Y`b`i bX`ni `hY`Ybž
VYgcbXYfg`]b`@`ÅbXYfb`a]h`ghfYb [Yb`NYbgi fYb" `8YbbcW`V`Y]Vh
XUg`h`Å [`]W`Y`Bi hnYfj Yf\`U`hYb`Y]b` ðX]_Uhc`f`XUZ0fž`k]Y`HY`Y [fUa

gY]bY': i b_h]cbYb'UbdUggYb'a i ggž'i a 'g]W\Yfni ghY''Ybž'XUgg'g]W\
Ui W'_f]h]gW\Y'Gh]a a Yb']b'Y]bYa 'Ui g[Yk c[YbYb'FU\ a Yb
Ài » Yfb'_ÒbbYb"

8YhU]`g

6Ygi W\Yb'G]Y'i bg'Ui Z.'X]Y!bUW\ f]W\ hYb"bYh