

J YfgW\`Yddh'i bX`[YZYggY`h.`8fUa U`]b 5hhYbXcfb`YbXYh`[`]a dZ`]W\

9]b`**!*Å\`f][Yf`k i fXY`]b`5hhYbXcfb`XfY`]Ghi bXYb`Ub[
VYXfc\hžV]g`BUW\VUfb`i bX`Y]b`Dc`]nY]`i bX`]a`ni f`i`i W\h
j Yf\U`ZYb"

⊕`5hhYbXcfbžY]bYf`GhUXh`]a`a`U`Yf]gW\Yb`GUi Yf`UbXž`k i fXY`Y]b
**!*Å\`f][Yf`A Ubb`ni a`C dZYf`Y]bYg`gW\cW_]YfYbXYb`J YfVfYW\Ybgž
XUg`g]W\`Ua`GcbbhU[bUW\ a`]hU[`YfY][bYhY`"Nk Y]?f]a`]bY`Y
XfUb[Yb`]b`gY]bY`K c\bi b[`Y]bž`ZYggY`hYb`i bX`_bYVY`hYb`]\bž
k Å\`fYbX`g]Y`bUW\`K Yfh[Y[Ybgh`ÅbXYb`gi W\hYb`i bX`k`]YXYf\c`h
; Y`XZcfXYfi b[Yb`ghY`hYb`"8]YgYf`[fUi gUa`Y`J cfZU`"\Uh`b]W\h`bi f
XUg`C dZYfž`gcbXYfb`Ui W\`X]Y`[YgUa`hY`BUW\VUfgW\UZh`]b
5i ZfY[i b[`j YfgYhnh"

8]Y`G]hi Uh]cb`bU\`a`Y]bY`YfgW\`fYW`YbXY`K YbXYž`U`g`X]Y`VY]XYb
HÅhYf`]b`XYf`K c\bi b[`XYg`A UbbYg`V`]YVYb`i bX`]\b`ZØf`a`Y`fYfY
Ghi bXYb`ZYgh\]Y`hYb`"9g`YfZcfXYfhY`j`]Y`A`i`hi bX`9]bZU`g`fY]W\hi a
j`cb`XYa`i`YgW\`ÅX][hYbž`i`a`gW\`]Y»`]W\`i`a`<]ZY`ni`V]hYb`"@Ui`h
XYa`Dc`]nY]VYf]W\h`[Y`Ub[`Yg`]\a`ž`Xi`fW\`Y]bYb`[YgW\]W_h
j`YfghYW`hYb`<]bk`Y]g`gY]bY`BUW\VUfb`Ui`Z`gY]bY`d`fY`_ÅfY`@U[Y
Ui`Za`Yf_gUa`ni`a`UW\Ybž`k`Ug`X]Y`YbghW\Y]XYbXY`K`YbXY`]b
X]YgYa`8fUa`U`Y]b`Y]hYhY"

B UW\ VUfgW\ UZh`]W\ Yf`Ni gUa` a`Yb\U`h`i bX F Yhhi b[

8]Y`BUW\VUfbž`X]Y`ni bÅW\gh`j`cb`Y]bYa`a`YX]n]b]gW\Yb`B`chZU`
Ui`g[Y[Ub[Yb`k`UfYbž`fYU[`]YfhYb`gW\`bY`i`bX`U`Ufa`]YfhYb`XYb
F`Yhhi`b[`gX]Ybgh`gck`]Y`X]Y`Dc`]nY]"`5`g`X]Y`9]bgUhn`_f`Å`ZhY`Y]bhfUZYbž
_cbbhY`XYf`**!*Å\`f][Y`gW\`]Y»`]W\`Ui`g`gY]bYa`<`Ui`g`Z]Y\`Yb`"9f

Yf`]h`Y]Wk hY`J Yf`Yhni b[Ybž`k i fXY`YXcWk`Ua Vi`Ubh`VY\UbXY`h
i bX`_ccb hY`gWk bY``k]YXYf`Ui g`XYa`? fUb`Yb\Ui g`Ybh`UggYb
k YfXYb"

8]Y`VY]XYb`HUHj YfX`ÅWk h[Ybž`Y]b` *!`Å\ f][Yf`A Ubb`i bX`gY]b
%+!`Å\ f][Yf`Gc\ bž`k UfYb`ni`X]YgYa`NY]hdi b`h`bcWk`ja` ; YV`Ai XY"
9]b`Dc`]nY]\i bXž`XYf`Ub`XYa`9]bgUhn`VYhY`][h`k Ufž`VfUWk hY`X]Y
YbhgWk Y]XYbXY`K YbXYž`]bXYa`Yf`X]Y`H`hYf`Ui Zgd`ØfYb`_ccb hY"
8]Yg`nY][h`Y]bXfi W_gj c``ž`k]Y`k]Wk h[`X]Y`5fVY]h`XYf`Dc`]nY]i bX
\fYf`j]YfVY]b][Yb`?c``Y[Yb`]ghž`i a`]b`gc`Wk Yb`Bch`U[Yb`fUgWk`ni
]bhYfj Yb]YfYb"

: YghbU\ a Yb`i bX`fYWk h`]Wk Y`? cbgYe i YbnYb

8]Y`VY]XYb`J YfX`ÅWk h[Ybž`X]Y`bUWk`5b[UVYb`XYf`9fa`]h`Yf
hØf`_gWk Yf`B Uh]cbU`]h`h`g]bX`i bX`g]Wk`]b`Y]bYa``Ui ZYbXYb
5gm]j YfZU\ fYb`VYZ]bXYbž`k i fXYb`j cf`Åi Z[`ZYgh[Ybca`a Yb`"8Yf
<UZhf]Wk hYf`\Uh`VYfY]hg`Y]bYb`l bhYfgi Wk`i b[g\UZhVYZY`\`k Y[Yb
XYg`J cfk i fZg`XYg`YfdYggYf]gWk Yb`A YbgWk Yb fUi Vg`Yf`UggYb"
K`Å\ fYbX`XYf` *!`Å\ f][Y`g]Wk`j cf` ; Yf]Wk`h`b]Wk`h`ni`XYb`J cfk ØfZYb
Åi » YfhYž`nY][hY`g]Wk`XYf`%+!`Å\ f][Y`hY]`k Y]gY`[Ygh`ÅbX][ž`gY]b
<UZhVYZY`\`k i fXY`YXcWk`[Y[Yb`5i ZU[Yb`Ui » Yf`J c``ni [`] YgYhnh"

8]Y`9fa`]h`i b[Yb`g]bX`XYfnY]h`bcWk`ja` ; Ub[Y``9g`V`Y]Vh
UVni k UfhYbž`k]Y`g]Wk`X]Y`fYWk h`]Wk Yb`GWk f]hY`Ybhk]W`Y`b`i bX
k Y`Wk Y`k Y]hYfYb`b Zcfa` Uh]cbYb`Ubg`@]Wk`h`_ca`a Yb`k YfXYb"
8]YgYf`J cfZU``k]fZ`h`b]Wk`h`bi f` : fU[Yb`ØVYf`G]Wk Yf\Y]h`i bX
Df`Aj Ybh]cb`Ui Zž`gcbXYfb`Ui Wk`ØVYf`X]Y`< YfUi gZcfXYfi b[Ybž`a`]h
XYbYb`XUg`5gm`gmghYa``_cbZfcbh]Yfh`]gh`Gc`Wk Y`J YfVfYWk Yb
_ØbbYb`Xi fWk`Y]b`gWk bY``Yg`i bX`YZZY`_h]j Yg`< UbXY`b`XYf`Dc`]nY]
gck c``j Yf\]bXYfh`U`g`Ui Wk`j YfZc`[h`k YfXYbž`k Ug`Xi fWk`XYb
dcg]h]j Yb`5i g[Ub[`X]YgYf`XfUa` Uh]gWk Yb`G]h`i Uh]cb`i bhYf`6Yk Y]g
[YghY``h`k]fX"

K]Wk h][_Y]h`j c b`B UWk VUfgWk UZhg\]ZY`i bX
gWk bY``Ya``< UbXY`b

8]YgYf'JcfZU''b'5hhYbXcfb']gh'Y]b'Y]bXfØW_]WXYg'6Y]gd]Y'XUZØfž
k]Y'k]W[h]['Y]bY'UiZaYf_gUaY'BUWVUfgWUZh]gh''8Yf'Aih'i bX
X]Y'gWbY''Y'FYU_h]cb'XYf'BUWVUfb'\UVYb'kU\fgWXY]b']W
GW'jaaYfYg'jYf\]bXYfh''9g]gh'Y]b'5iZfiZ'Ub'U''Yž'kUW'gUa'ni
gY]b'i bX'Y]bUbXYf'ni'ibhYfghØhYb'j'cf'U''Ya'']b'NY]hYb'j'cb
BchZÀ''Yb'cXYf'JYfXUW'hga'caYbhYb''8Yf'gWfYW_]WXY'JcfZU''
nY][hž'XUgg'XUg'Ni'gUa' aYbUfVY]hYb'i bX'['Y[YbgY]h][Y'5W'hYb']b
XYf'; YaY]bXY'Zi bXUaYbhU'Y'G]WXYf\Y]hgUgdY_hY'ZØfXYfb'_Ubb''

8]Y'?'f]a]bU']hÅhg`U[Y']b'5hhYbXcfb

⇒'5hhYbXcfbž'Y]bYf'GhUXh']a'GUIYf'UbXž'\Uh'X]Y'?'f]a]bU']hÅhgfUhY
]b'XYb''YhnhYb'↘\fYb'GW'kUb_i b[Yb'i bhYf'Y[Yb''@Ui h'XYf
Dc`]nY]]WXYb'?'f]a]bU'ghUh]gh]_fD?GŁ'gh]Y['X]Y'NU'\''XYf
Kc\bi b[gY]bVfØWXY]b'BCfXf\Y]b!K YghZU'Yb'i bX'XUa]h'Ui W'']b
5hhYbXcfb']b'XYb''YhnhYb'↘\fYb'hYbXYbn]Y''Ub''⇒'↘\f'&\$&%
ki fXYb'UbXYgkY]h'YhkU'%'\$\$\$\$'Kc\bi b[gY]bVfØWXY'fY[]ghf]Yfhž
kUg'Y]bYb'5bgh]Y['['Y[YbØVYf'XYb'Jcf'U\ fYb'XUfghY''h''8]YgY
, VYf[f]ZY'hfU[Yb'ni f'U''[YaY]bYb'6Yi bfi \][i b[']'b'XYb
; YaY]bXYb'VY]ž'XU'g]Y'cZi'a]h'; YkU'h'i bX'XYa' 'A]ggVfUi W'j'cb'

JYfhfUi Yb'j YfVi bXYb'g]bX''8]Y'Dc`]nY]]b'5hhYbXcfb'\Uh'XUfUi Z]b
jYfghÅf_hY' 'A U» bU\ aYb'ni f'DfÅj Ybh]cb'i bX'5i Z_`Åfi b['['YghUfhYhž
ia'X]Y'G]WXYf\Y]h']b'XYf'; YaY]bXY'ni'j YfVYggYfb''9]bY'cZZYbY
?ca' a'ib[_Uh]cb'nk]gWXYb'XYb'6Øf[Yfb'i bX'XYf'Dc`]nY]]gc''
\Y'ZYbž'_f]a]bY''Y'5_hj]hÅhYb'ZfØ\ nY]h]['ni'Yf_YbbYb'i bX'ni
aY'XYb''

8]Y'fYW'h]WXYb'?'cbgYei YbnYb'XYg YfdfYggYf]gWXYb'AYbgWXYbfUi VYg

⇒'8Yi hgW'UbX'k]fX'XYf'HUHVYghUbX'XYg'YfdfYggYf]gWXYb
AYbgWXYbfUi VYg]b'z'&))'XYg'GhfUZ[YgYhnVi WXYg'fGh; 6Ł
VY\UbXY'h''8]YgYf'DUfU[fUd\ 'g]Y\h'\c\Y'GhfUZb'j'cfž'X]Y'Y'bUW
GW'kYfY'XYf'HU'hk]gWXYb'ZØbZ'↘\fYb'i bX''YVYbg'Ub[Yf
: fY]\Y]hgghfUZY''Y[Yb'_ØbbYb''6Y]'a]bXYf'Å\][Yb'HÅhYfbž'k]Y]'a
cVYb'VYgWf]YVYbYb': U''ž[Y'hYb'UbXYfY'FY[Y'i b[Ybž'X]Y'Ui Z

XYa`đ [YbXghfUZfYWXh`VUg]YfYb" <]YfVY]`k]fX`XUg`5`hYf`XYg`HÀhYfg
VYfØW_g]WXh][h`i bX`X]Y`9fn]Y\i b[`Y\Yf`]b`XYb`J cfXYf[fi bX
[YghY`h"8Yf`HÀhYf`_Ubb`]b`X]YgYa` : U``XYbbcWX`a`]h`Y]bYa
đ [YbXghfUZY`j cb`V]g`ni`nY\`b`đ\`fYb`fYWX`bYbž`k Ybb`X]Y`HUh`U`g
VYgcbXYfg`gWX`k Yf`[Yk`YfhY`h`k]fX"

8 Ug`j`cf`]Y[YbXY`9fY][b]g`k YW`h`Ui` WX`[YgY`gWX`UZh`]WX`Y`8YVUhhYb
ØVYf`G]WX`Yf\Y]hž`5gm`i bX`đ`hY[fUh]cb"8Yf` : U``]gh`Y]b`6Y]gd]Y`ZØf
X]Y`<YfUi`gZcfXYfi b[Ybž`XYbYb`g]WX`X]Y`đ`gh]n`i bX` ; YgY`gWX`UZh
[Y[YbØVYfg]Y\hž`k Ybb`?f]a`]bU`]hÀ`h`a`]h` : fU[Yb`XYf
A][fUh]cbgdc`]h]_`j YfVi bXYb`k]fX"

B UWX VUfgWX UZh`]WX`Y`<]`ZY`]a` : c`_i`g`

8]Y`gWX`bY`Y`F`YU`_h]cb`XYf`B UWX`VUfb`i bX`XYf`Dc`]nY`]b`5hYbXc`fb
nY][hž`k]Y`k]WX`h][`Y]bY`ghUf`_Y`8cfZ[Ya`Y]bgWX`UZh`]gh`B UWX`VUfbž
X]Y`Ui`Za`Yf`_gUa`g]bX`i bX`g]WX`[Y[YbgY]h][`i bhYfghØhnYbž`_ØbbYb
YbhgWX`Y]XYbX`gY]bž`i a` [YZÀ`f`]WX`Y`G]hi`Uh]cbYb`ni`YbhgWX`ÀfZYb"đ
X]YgYa` : U``Yf`_Ubb`hYb`X]Y`B UWX`VUfb`c`ZYb`_i`bX][ž`XUgg`Yhk`Ug
b]WX`h`gh]a` a`hYž`U`g`g]Y`X]Y`i b[Yk`Ø`b`]WX`Yb`i`a`ghÀ`bXY`VYa`Yf`_hYb
i bX`Ybhgd`fYWX`YbX`\`UbXY`hYb"

Ghi`X]Yb`nY][Ybž`XUgg`B UWX`VUfgWX`UZh`g\`]ZY`i`bX
; Ya`Y]bgWX`UZh`gYb[U[Ya`Ybh`Yf\`YV`]WX`ni`f`G]WX`Yf\Y]h`i bX`ni`a
gcn]U`Yb`Ni`gUa`a`Yb\`U`h`]b`Y]bYa``K`c`b[YV]Yh`VY]hfU[Yb`_ØbbYb"
8Yf`5i`ZVUi`j`cb`bUWX`VUfgWX`UZh`]WX`Yb`BYh`nk`Yf`_Yb`i`bX
fY[Y`a`À»][Y`HfY`ZYb`_ØbbYb`\`Y`ZYbž`Y]b`6Yk`i`gghgY]b`ZØf`X]Y
G]WX`Yf\Y]h`]b`XYf`B UWX`VUfgWX`UZh`ni`gWX`UZZYb"đ`XYf`F`Y[Y`ZØ`\`Yb
g]WX`]b`gc`WX`Yb` ; Ya`Y]bgWX`UZh`Yb`X]Y`6Yk`c`b`Yf`g]WX`YfYf`i`bX`g]bX
Y\Yf`VYfY]hž`5`Ufa`ni`gWX`U[Ybž`k`Ybb`Yhk`Ug`J`YfX`À`WX`h][Yg
[YgWX`Y\`h"

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