I bZU``'a]h'XfY]`J Yf`YhnhYb`]b`F` \ YXU!
K]YXYbVfØW_. '5VV]Y[Yb`YbXYh`\ YZh][

J Yf_Y\fgi bZU``]b`F` \ YXU!K]YXYbVfØW_. '8fY]`J Yf`YhnhY`bUW
Ni gUa a Ybghc» `VY]a` '5VV]Y[Ya UbØj Yf" `F Yhhi b[ gX]YbghY`]a
9]bgUhn"

9]b`J Yf_Y\fgi bZU``žXYf`g]W`]b`XYf`GhUXh`F` \ YXU!K]YXYbVfØW_
YfY][bYhYž`\Uh`Ua` ]gd`ÅhYb`'5VYbX`XYg`%-`"5i [i gh`&\$&( `Yf`YV`]W`Y
5i gk]f_i b[Yb`Ui ZXYb`J Yf_Y\fgZi gg`i bX`X]Y`G]W`Yf`Y]h`Ui ZXYb
GhfU» Yb" ; Y[Yb`&&.` *`I` \f`\_Ua` `Yg`Ui ZXYf`F Ybhfi dYf`GhfU» Yž
bU`Y`XYf`9]ba ØbXi b[ `ni f`5i fYUž`ni`Y]bYa`] YZ`Å`f`]W`Yb
Ni gUa a Ybghc» `nk ]gW`Yb`nk Y]: U\fnYi [ Yb" `8Yf`I bZU``n]Y`h`b]W`h
bi f`X]Y`5i Za Yf_gUa`\_Y]h`XYf`Dc`]nY]ž`gcbXYfb`Ui W`XYf`Öfh]W`Yb
F Yhhi b[gX]YbghY`Ui Zg]W`"

⊕j c`j ]Yfh]b`XYb`J cfZU``k UfYb`nk Y]`D_k !: U\fyf]bbYbž`Y]bY
' +!`Å\f][ Y`Ui g`8fYbghY]bZ` fhi bX`Y]bY`%-`!`Å\f][Y`Ui g`<U[Ybž
gck]Y`nk Y]`6Y]ZU`fYf" `8]Y`8fYbghY]bZ` fhYf]b`k Uf`a` ]h]`fYa
J c`\_gk U[ Yb`H][i Ub`Ui ZXYa`K Y[`]b`F`]W`hi b[`A UfVi f[ ž`U`g`g]Y
VYUVg]W`h][ hYž`bUW` ``]b_g]b`X]Y`5i fYU`UVni V]Y[Yb"
K `Å`fYbXXYggYb`b`Å`YfhY`g]W` ]`f`Y]b`B]ggUbž`[ YghYi Yfh]j cb`XYf
`Øb[ YfYb`: U\fyf]bž`X]Y`j cb`]\fYa` %, !`Å\f][ Yb`6Y]ZU`fYf`VY[`Y]hYh
k i fXY" `⊕`X]YgYa`\_f]h]gW`Yb`A ca Ybh`_Ua` `Yg`ni f`?c``]g]cbž`X]Y`ZØf
a Y\fyfY`6YhY][ hY`J Yf`Yhhi b[ Yb`ni f`: c`[Y`Å`UhhY"

8]Y`J Yf`Yhni b[Yb`i bX`X]Y`F YU\_h]cbYb`XYf
F Yhhi b[g_f`ÅZhY

B UW`XYa`Ni gUa a Ybghc» `k i fXYb`X]Y`J Yf`YhnhYb`i a [ Y`YbX`j cb
XYb`j cf`C fhghU]cb]YfhYb`F Yhhi b[ gX]YbghYb`j Yfgcf[h" `8]Y
: U\fyf]bbYb`Yf`]hYb`i bhYfgW`]YX`]W`Y`GW`k YfY[fUXY`j cb

J Yf`Yhni b[ Yb/k Å\fybX`X]Y': U\fyf]b`XYg`J K`bi f`Y]W`hij Yf`Yhnh
k i fXYž`k Uf`X]Y`B]ggUb!: U\fyf]b`gW`k YfYf`[YhfcZZYb`k cfXYb" `Af
6Y[`Y]hYf`]\b[Y[Yb`Yf`]h`YVYbZU`g`bi f`Y]W`hY`J Yf`Yhni b[ Yb" `5`Y
6YhfcZZYbYb`k i fXYb`ni`XYb`bÅW`gh[ Y`Y[YbYb`?fUb`Yb`Åi`gYfb`]b
; ØhYfg`c`i`bX`CY`XY`hfUb`gdcfh]Yfhž`i`a`Xcfh`k`Y]hYf`VY`UbXY`h`ni
k YfXYb"

8]Y`Dc`nY]`bU`a`VY]`XYf`I`bZU`Ui`ZbU`a`Y`X]Y`b`ch`k`YbX][`Yb
9fa`]h`i`b[ Yb`Ui`Zž`i`a`XYb`<Yf[ Ub[ `XYg`I`bZU`g`j`c`gh`ÅbX][`ni
_`ÅfYb" `Hfcm`XYg`ghfYgg][Yb`i`bX`Ya`ch]cbU`Yb`A`ca`Yb`hg`nY][`hY
g]W`X`Yf`F`Yh`i`b[gX]Yb`gh`[i`h`cf[Ub]g]Yf`h`i`bX`UfVY]hYhY`<UbX`]b
<UbX`a`]h`XYb`9]bgUhn`f`Å`ZhY`b`XYf`i`Yi`Yfk`Y`f`ž`X]Y`ni`f`I`bZU`ghY`Y`Y
[Yfi`Zyb`k`i`fXYb" `K`Å\fybX`]\fyf`5fVY]hYb`k`i`fXY`ZY`gh[ YghY`hž`XUgg
6Yhf]YV`gghc`ZY`Ui`g`XYb`i`U`fnYi`[ Yb`Ui`g[ YhfYhYb`k`UfYb" `8]YgY
k`i`fXYb`Xi`fW`X]Y`i`Yi`Yfk`Y`f`Y]bgUhn`f`Å`ZhY`ZUW`[YfYW`h
UV[YghfYi`hž`i`a`k`Y]hYfY`i`YZU`fYb`ni`j`Yfa`Y]XYb"

6Y\]bXYfi b[Yb`]a`GhfU» Ybj Yf`Y`f`

8Yf`I`bZU`ZØ`fhY`ni`Y]bYf`J`c`gdYffi`b[`XYf`F`Yb`hfi`dYf`GhfU»Y`ZØf
Yhk`U`nk`Y]`Ghi`bXYbž`k`Å\fybX`X]Y': U`fnYi`[Y`[ YVcf[ Yb`k`i`fXYb"
8]YgY`A`U»bU`a`Yb`k`UfYb`YfZcfXYf`]W`ž`i`a`b]W`h`bi`f`X]Y
5i`Zf`Åi`a`UfVY]hYb`ni`Yfa`Ø[ `]W`Yb`ž`gcbXYfb`Ui`W`X]Y`G]W`Yf`Y]h
U`Yf`J`Yf`Y`f`ghY]`bY`a`Yf`ni`[ Yk`Å`f`Y]ghYb" `8]Yg`U`h`hY`ni`f`i`c`[Yž
XUgg`XYf`J`Yf`Y`f`]b`XYf`I`a`[YVi`b[ `ghUf`VY]b`hf`ÅW`h][`h`k`Uf"
5i`hcZU`fYf`i`bX`5bk`c`b`Yf`a`i`gghYb`a`]h`XYb`5i`gk`]f`_i`b[Yb
fYW`bYb`ž`X]Y]b`gc`W`Y]bYf`G]hi`Uh]cb`b]W`h`gY`hYb`g]bX"

8]Y`Dc`nY]`UddY`Yf`h`Ub`U`Y`J`Yf`Y`f`ghY]`bY`a`Yfž`]b`Y`XYf`
G]hi`Uh]cb`VYgcbXYfg`j`cfg]W`h][`i`bX`Ui`Za`Yf`gUa`ni`gY]bž`i`a
XYfUfh][`Y`I`bZ`Y`ni`j`Yfa`Y]XYb" `8Yf`hfU[]gW`Y`J`cfZU`
j`YfXYi`h]W`hž`k`]Y`gW`bY`Y]bY`U`h`Å[ `]W`Y`<UbX`i`b[`k`]Y`XUg
5VV]Y[Yb`]b`Y]bY`UbXYfY`GhfU»Y`ni`Y]bYa`gW`k`YfYb`I`bZU`ZØ`fYb`
_Ubb" `gVYgcbXYfY`Ui`Zj`]Y`VYZU`fYbYb`GhfU»Yb`]gh`Y`g`k`]W`h][`ž
X]Y`J`cfZU`f`h`UbXYfYf`i`U`fnYi`[ Y`ni`VYUW`hYb`i`bX`XUg`5VV]Y[Yb
a`]h`6YXUW`h`ni`d`UbYb"

8]Y`9fa`]h`i`b[Yb`ni`X]YgYa`I`bZU`g]bX`bcW`]a`i`Ub[ Y" `9g`k`]fX

YhnhXUfUi Z[Yk UfhYhž'k Y]hYfY'8YhU]g'ni '_ÄfYb'i bX
a Ò['j]WYfk Y]gY'ni gÄhn']WY'NYi [Yb'VYZFU[Yb'ni '_ÖbbYb"
GhfU» Ybj Yf_Y\fgg]WYf\Y]h'V'Y]Vh'Y]b'nYbhfU'Yg'H\Ya U'ZØf'X]Y
Dc`nY]ž'i bX'X]YgY'5fh'j cb'J cfZÄ`Yb']gh'ja a Yf'Y]b'; fi bXž'X]Y
6Yk i ggHgY]bgV]'Xi b['i bX'X]Y'J Yf_Y\fgYfn]Y\i b['ni
]bhYbg]j]YfYb"5i hca cV]'VYg]hnYf'i bX': U\fyf'gc`hYb'ghYhg'Ui ZX]Y
J Yf_Y\fgVYX]b[i b[Yb'UW hYb'i bX'XYZYbg]j 'ZU\fybž'i a'X]Y
G]WYf\Y]h'U`Yf'ni '[Yk Ä\f'Y]ghYb"

J YfU bhk cfhi b['ja 'GhfU» Ybj Yf_Y\ f

8Yf'J cfZU`k]fZi[fi bX'Y[YbXY': fU[Yb'ni f'J YfU bhk cfhi b['ja
GhfU» Ybj Yf_Y\ f'Ui Z'»XYf'J Yf_Y\ fghY]'bY\ a Yf'\ Uh'X]Y'DZ]W hž'X]Y
G]WYf\Y]h'U`Yf'ni '[Yk Ä\f'Y]ghYbž'i bX'_Y]bY'I bUW hgUa _Y]hYb
_ÖbbYb'_UhUghfcd\U'Y': c'[Yb'\ UVYb"9g']gh'Yb hgWY]XYbXž'XUgg
U`Y': U\fybXYb']\fY': U\fk Y]gY'ØVYfXYb_Yb'i bX'Ub'X]Y'F]g]_Yb
Yf]bbYfbž'X]Y'a]h', VYfa i hcXYf'5V'Yb_i b['ja 'GhfU» Ybj Yf_Y\ f
j YfVi bXYb'g]bX"

< Äi Z][Y'I fgUW Yb'ZØf'J Yf_Y\ fgi bZÄ`Y

J Yf_Y\ fgi bZÄ`Y'k]Y'XYf']b'F\YXU!K]YXYbVfØW_YfY][bYb'g]W
\Äi Z]['Ui g'j YfgW]YXYbYb'; fØbXYb"Hmd]gWY'I fgUW Yb'g]bX
5V'Yb_i b['k Ä\fybX'XYg': U\fybgž'ØVYf\Ø\hY'; YgWk]bX]['_Y]hYb
cXYf'A]ggUW hi b['j cb'J Yf_Y\ fgfY[Y'b"@Ui h'Y]bYf'GhUh]gh]_XYf
8Yi hgWYb'J Yf_Y\ fgk UW h'g]bX'5V'Yb_i b[Ybž']bgVYgcbXYfY
Xi fW'A cV]'hY'YZcbYž'Y]bY'XYf'\Äi Z][ghYb'I fgUW Yb'ZØf'I bZÄ`Y"
= a Yf'a Y\f': U\fyf'bi hnYb'k Ä\fybX']\fYf': U\fh'Ga Ufhd\cbYgž
k Ug'ni 'Y]bYf'XYi h']WYb'9f\Ø\i b['XYg'F]g]_cg'ZØ\fh"

9]b'k Y]hYfYf': U_hcfž'XYf'ni 'Ni gUa a YbghØ» Yb'ZØ\fhž'g]bX
i b[Øbgh][Y'K YhYfVYX]b[i b[Yb"6Y]'F Y[Yb'cXYf'GW bYY']gh'X]Y
G]W h'Y]b[YgW fÄb_h'i bX'X]Y'6fYa gk Y[Y'j Yf'Äb[Yfb'g]W"8]YgY
6YX]b[i b[Yb'_ÖbbYb'XUni 'ZØ\fybž'XUgg': U\fyf'b]W h'fYW hMY]h][
Ui ZX]Y'J Yf_Y\ fg]hi Uh]cb'fYU[]YfYb'_ÖbbYbž'k Ug'k]YXYfi a'ni
I bZÄ`Yb'ZØ\fh"

GhUh]gh]gW Y`8 UhYb`ni a`l bZU``[YgW Y\Yb

5_hi Y``j YfÖZYbh]W hY`8 UhYb`XYg`GhUh]gh]gW Yb`6i bXYgUa`hYg
nY][Ybž`XUgg]a`f\`&\$&&]b`8Yi hgW`UbX`a`Y`f`U`g`&ž( `A`)]cbYb
J Yf_Y`fgi bZÄ`Y`fY[ ]ghf]Yfh`k`i`fXYbž`j`cb`XYbYb`ØVYf`" \$\$\$\$
DYfgcbYb`j`Yf`Y`h`h`k`i`fXYb`"9]b`Yf`YV`]W Yf`HY`]X]YgYf`l`bZÄ`Y
[YgW]Y`h`Ub`?`fYi`ni`b[Yb`i`bX`9]ba`ØbXi`b[ Ybž`k`Ug`X]Y
; YZÄ`f`]W`\_Y]h`X]YgYf`J`Yf`\_Y`f`gg]hi`Uh]cbYb`j`YfXYi`h]W`h`"9]bY
Ghi`X]Y`XYg`6i`bXYgj`Yf`_Y`f`ga`]b]ghYf]i`a`g`U`h`Yf[YVYbž`XUgg`Y`h`k`U
(`\$`Dfc`nYbh`XYf`l`bZÄ`Y`a`]h`DYfgcbYbgW`UXYb`Xi`fW`:`Y`Y`f`VY]a
5VV]Y[Yb`j`Yfi`fgUW`h`k`YfXYb`"

B chZU``a U» bU\ a Yb`VY]`J Yf_Y`f`gi bZÄ`Y`b

⇒ a`:`U``Y]bYg`J`Yf`\_Y`f`gi`bZU``g`gc``hYb`VYgh]a`a`hY
B chZU``a U» bU\ a Yb`Yf[ f]ZYb`k`YfXYbž`i`a`X]Y`G]W`Yf`Y]h`U``Yf
6YhY][hYb`ni`i`[ Yk`Ä`f`Y]ghYb`"Ni`b`ÄW`gh]gh`Y`g`k`]W`h][ ž`X]Y
l`bZU``ghY``Y`ni`i`g]W`Yfbž`i`a`k`Y]hYfY`l`bZÄ`Y`ni`j`Yf`]bXYfb`"8Ug
5b`Y[ Yb`j`cb`K`Ufbk`YghYb`i`bX`XUg`5i`ZghY``Yb`j`cb`K`UfbXfY]YW`Yb
g]bX`[ fi`bX`Y[ YbXY`A U» bU\ a Yb`"

⇒ a`5bgW`i`gg`gc``hY`]a`a`Yf`XYf`B`chfi`Z`%&`[ Yk`Ä`h`k`YfXYbž`i`a
a`YX]n]b]gW`Y`<]ZY`i`bX`FY`h`i`b[ gX]YbghY`ni`U`Ufa`]YfYb`"8]Y
6YghÄh][i`b[ j`cb`J`Yf`Y`h`i`b[Yb`]gh`d`f]c`f]g]Yfhž`i`bX`X]Y`J`Yf`Y`h`h`Y`b
gc``hYbž`ZU``g`b`Øh][ž`V]g`ni`a`9]b`hfY`ZYb`XYf`F`Y`h`i`b[g`f`Ä`Z`h`Y
j`Yfgcf[ h`k`YfXYb`" <Ä`i`Z][k`]fX`Ui`W`X]Y`:`Yi`Yfk`Y`f`VYb`Øh][ hž`i`a
l`bZU``ZU`fnYi`[Y`ni`i`g]W`Yfb`i`bX`6Yhf]YVgghc`ZY`Ui`Zni`bY`a`Yb`"

J Yf_Y`f`gg]W Yf`Y]h`i`bX DfÄj`Yb]cbga U» bU\ a Yb

l`a`X]Y`J`Yf`\_Y`f`gg]W`Yf`Y]h`i`ni`Yf`Ö`Yb`i`bX`l`bZÄ`Yb`k`]Y`]b`F`Y`XU!
K`]YXYbVfØW`_Yb]h[Y[Ybni`k`]f`\_Ybž`g`Y`h`h`X]Y`Dc`]h]_`Ui`Z
j`YfgW]YXYbY`DfÄj`Yb]cbga U» bU\ a Yb`" ð]h]Uh]j`Yb`ni`f
J`YfVYggYfi`b[`XYf`J`Yf`_Y`f`g`Y`fn]Y`l`i`b[ ž`k`]Y`VY]gd]Y`g`k`Y]gY
GW`i`i`b[ Yb`ZØf`↑`b[Y`:`U`f`Yfž`k`YfXYb`[ YZØfXYfh`"5i`»`YfXYa
k`YfXYb`J`Yf`_Y`f`g`\_`cb`h`f`c``Yb`j`YfghÄ`f`hž`i`a`"

; YgWk]bX][_Y]hgØVYfhfYhi b[Yb'i bX'UbXYfY'J Yf_Y\fgj YfghØ» Y
ni 'U\bXYb"

9]b'k Y]hYfYf'5gdY_hi]gh'X]Y'5i Z_`Àfi b['ØVYf'X]Y'; YZU\fyb'XYf
5V`Yb\_i b[ 'ja 'GhfU» Ybj Yf\_Y`f"? Ua dU[bYbž'X]Y'XUfUi ZUVn]Y`Ybž
XUg'6Yk i gghgY]b'ZØf'X]Y'; YZU\fyb'Xi fW'Ga Ufhd\cbYg'i bX
UbXYfY'5V`Yb\_i b[ Yb'ni 'gW`ÀfZYbž'g]bX'ni bY\`a YbX'k]W'h]["'8]Y
6i bXYgfY[]Yfi b['\Uh'ni XYa 'ϕ]h]Uhj] Yb'[YghUfhYhž'X]Y'XYb
g]WYfYb'9]bgUhn]j cb'HYW`bc`c[]Yb'ja ' : U\fnYi ['ZØfXYfbž'i a
l bZ`Y'ni 'fYXi n]YfYb'i bX'X]Y'J Yf\_Y`fgg]WYf\Y]h']bg[YgUa h'ni
j YfVYggYfb"

8YhU]`g

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