

GWk YfYf'A chcffUXi bZU``]b'BYi gg.
: U\ fYf'Ui g'8 ØggY`XcfZ'j Yf`Yhnh

6Y]'Y]bYa 'l bZU``]b'BYi gg'k i fXY`Y]b'' \$!`Ä\ f][Yf
A chcffUXZU\ fYf'gWk Yf'j Yf`Yhnh"8]Y'Dc`nY]'gi W'h'bUW
NYi [Yb"

5a '8]YbghU[žXYa '&\$"5i [i ghž'YfY][bYhY'g]W'Ui ZXYf'; fUZ
@JbXgVYf[!GhfU»Y]'b'BYi gg'Y]b'gWk YfYf'J Yf_Y\ fgi bZU`žVY]'XYa
Y]b'' \$!`Ä\ f][Yf'A chcffUXZU\ fYf'Ui g'8 ØggY`XcfZ'gWk YfYb
J Yf`Yhni b[Yb'Yf'hYb`Uh"8]Y'?c`g]cb'ZubX'[Y[Yb'%(.\$) 'l \ f
ghUhhž'U'g'XYf'A chcffUXZU\ fYfž'XYf'j cfZU\ fhgVYfYW'h][h'k Ufž'a]h
Y]bYa '?`Y]bk U[Yb'ni gUa a Ybgh]Y»"8]YgYf'?`Y]bk U[Yb'k i fXY
j cb'Y]bYf'' \$!`Ä\ f][Yb': fUi '[Y`Yb_hž'X]Y'j cb'Y]bYa
:]fa Yb[Y`ÄbXY'Ui ZX]Y'GhfU»Y`Y]bZ \ f"

8Yf'Ni gUa a Ybghc»`YbXYhY'ZØf'XYb'A chcffUXZU\ fYf'XfUa Uh]gWk "
K Ä\ fYbX`Yf'a]h'gWk YfYb'J Yf`Yhni b[Yb']bg'?fUb_Yb\Ui g
[YVfUW'h'k i fXYž'Yf'hYb'X]Y': U\ fYf]b'XYg'5i hcg'bi f`Y]W'hY
6`Yggi fYb"8]Yg'nY][h'Y]ba U'a Y\ fž'k]Y'[YZÄ\ f`]W'gc`WY
G]hi Uh]cbYb'ja 'GhfU»Ybj Yf_Y\ f'gY]b'_ÖbbYb" C Zha U'g'g]bX`Yg
6fi W'hY]Y'j cb'GY_i bXYbž'X]Y'ØVYf'K c\`i bX'K Y\Y`YbhgWY]XYbž
]bgVYgcbXYfY'k Ybb`Yg'i a '?fUZU\ fnYi [Y'i bX'A chcffÄXYf'[Y\h"

I bZU`Ui ZbU\ a Y'i bX'6Yf[i b[ga U» bU\ a Yb

8]Y'l bZU`ghY`Y'k i fXY'j cb'XYb'fYhni b[g_fÄZhYb'ia [Y\YbX
UV[Yg]WYfh"8]Y'Dc`nY]'k Uf'gWbY`j cf'Cfhi bX'ØVYfbU\ a `X]Y
I bZU`Ui ZbU\ a Y"8U`VY]XY': U\ fnYi [Y'bUW`XYa 'J cfZU`b]W'h
a Y\ f'ZU\ fVYfY]h'k UfYbž'a i gghYb'g]Y'j cb'5VgW`Yddi bhYfbY\ a Yb
YbhZYfb'h'k YfXYb"8UVY]'ghY`hY`X]Y'Dc`nY]'XUg'A chcffUX'U'g
6Yk Y]ga]hY`g]WYf"8]YgY'A U» bU\ a Y'gh'k]W'h][ž'ia `XYb

[YbUi Yb'<Yf[Ub['XYg'I bZU`g'ni ' _`ÄfYb'i bX'a Ö[`]WXY'I fgUWXYb
ni 'Yfa]hhY`b"

I bZÄ`Y`k]Y`X]YgYf`k YfZYb`cZi: fU[Yb`bUW`XYf': U\fk Y]gY`Ui Zž
VYgcbXYfg`ja ' <]bV`]W_`Ui ZX]Y`9]b\U`hi b['XYf`J Yf_Y\fgfY[Y`b"
A chcffUXZU\fyb`YfZcfXYfh`b]W`h`bi f`Y]b`\c\Yg`A U»`Ub` ; YgW]W_ž
gcbXYfb`Ui W`Y]b`j YfghÄf`_hYg`6Yk i gghgY]b`ZØf`UbXYfY
J Yf_Y\fgfY[`bY\`a Yf`"8]Y`HUhgUWXYž`XUgg`X]Y`?c``]g]cb`Ui ZY]bYf
GhfU»`Y`ghUhhZUbXž`Ui Z`XYf`XYf`?fUXZU\fyf`J cfZU\fh`\UhhYž`a UW`h
XYb`I bZU`VYgcbXYfg`hfU[]gW`"I bUW`hgUa _Y]h`cXYf`a Ub[Y`bXY
Gcf[ZU`h`_Ubb`]b`gc`WXYb` : Ä`Yb`j Yf\YYfYbXY` : c`[Yb`\UVYb"

5`Y`6YhY`][hYb`k i fXYb`]bg`bÄW`ghY`?fUb_Yb`U`i g`[YVfUW`hž`i a
Xcfhj Yfgcf[h`ni`k YfXYb`"K Ä\fybX`X]Y` : U\fyf]b`XYg`?`Y]bk U[Ybg
gW`bY`VY\UbXY`h`k YfXYb`_cbbhYž`ghY`hY`g]W`ZØf`XYb
A chcffUXZU\fyf`Y]bY`YfbghY`G]hi Uh]cb`XUfž`X]Y`a Ö[`]WXYfk Y]gY
k Y]hYfY`a YX]n]b]gW`Y`9]b[f]ZY`YfZcfXYf`]W`a UW`h`Gc`W`Y
J Yf`Y`hni b[Yb`_ÖbbYb`b]W`h`bi f`d`mg]gW`Yž`gcbXYfb`Ui W`
dgmW]gW`Y`B UfVYb`\]bhYf`UggYb"

NYi [YbUi Zfi Z

⇒ F U\`a Yb`XYf`9fa]h`i b[Yb`V]hhY`h`X]Y`Dc`nY`i a `A]h`]`ZY.
NYi [Ybž`X]Y`XYb`J cfZU`VYcVUW`hY`h`\UVYb`cXYf`UbXYfY`fY`Yj UbhY
⇒ Zcfa Uh]cbYb`VYfY]hghY`Yb`_ÖbbYbž`k i fXYb`Ui Z[YZcfXYfhž`g]W`
VY]a `J Yf_Y\fg_ca a]ggUf]Uh`%i bhYf`XYf`HY`YZcbbi a a Yf`\$&%' %
' \$!\$!`ni `a Y`XYb`"C Zh`\Y`ZYb`5i [YbnYi [Yb`YbhgW`Y]XYbX`XUVY]ž
I bZÄ`Y`f]W`h][`ni`fY`_cbghfi]YfYb"

I bZÄ`Y`k]Y`X]YgYf`g]bX`A U\bi b[Yb`Ub`U`Y`J Yf_Y\fgfY[`bY\`a Yfž
'YXYfnY]h`Ui Za Yf_gUa `i bX`j cfg]W`h][`ni`ZU\fyb`"; YfUXY`]b
GhÄXhYbž`k c`XYf`J Yf_Y\f`X]W`h`i bX`X]Y`GhfU»`Yb`j]Y`Y]W`h`b]W`h
]a a Yf`]b`cdh]a U`Ya `Ni ghUbX`g]bXž`a ØggYb`U`Y`6YhY`][hYb
Ui ZY]bUbXYf`F ØW_g]W`h`bY\`a Ybž`i a `XYfUfh][Y`G]hi Uh]cbYb`ni
j Yfa Y]XYb"

⇒ g[YgUa`hj YfXYi`h]W`h`X]YgYf`I bZU`X]Y` ; YZU\fyb`XYg
GhfU»`Ybj Yf_Y\fg`i bX`X]Y`J YfUbhk`cfhi b[ž`X]Y`YXYf` : U\fyf`hfÄ[`h"

6Y]XY : U\fyf`VYZUbXYb`g]W`b`Y]bYa`A ca`Ybh`b`XYa`X]Y
J Yf_Y\fgg]hi Uh]cb`AhhY`UbXYfg`Ui`g[Y\Yb`_ObbYb`"8]Y
K`]W`h][`_Y]h`X]Y`J Yf_Y\fgfY[Y`b`ni`fYgdY_h]YfYb`i`bX`Y]bY
XYZYbg]j`Y : U\fk`Y]gY`Y]bni`bY`a`Yb`z`_Ubb`b]W`h`[`Ybi`[`VYhcbh
k`YfXYb`"

8]YgY`J`cf`ca`a`b]ggY`g]bX`b]W`h`bi`f`GhUh]gh]_Yb`/`g]Y`VYhfYZYb
@VYb`z`G]W`Yf\Y]h`i`bX` ;`Ygi`bX\Y]h`"X`XY`?`c`"]g]cb`\Uh` :`c`[`Yb`i`bX
\`bhYf`A`ggh]\`fY`Gdi`fYb`z`b]W`h`bi`f`VY]`XYb`X]fY`_h`6YhY"][`hYb`z
gcbXYfb`Ui`W`VY]`XYfYb` :`Ua`]`Yb`i`bX` :`fYi`bXYb`"8]Y` :`fU[`Y`b`UW
XYf`G]W`Yf\Y]h`i`a` `J Yf_Y\`f`]gh`Y]b`gh`A`bX][`d`f`A`gYbhYg`H\Ya`U`z`X`Ug
gh`A`bX][`Y`5i`Za`Yf`_g`Ua`_Y]h`Yf`Zc`f`X`Y`fh`"

J`Yf`_Y`\f`gi`b`ZU``ghUh]gh]_Yb`i`b`X`X`Y`f`Y`b` 6YXYi`hi`b`[

⊕`8Yi`hgW`UbX`YfY][`bYb`g]W`h`A`[``]W`nU`\fY]W`Y`J`Yf`_Y`\f`gi`b`Z`A``Y`z
j`cb`XYbYb`j`]Y`Y`g`W`k`YfY`J`Yf`Y`hni`b`[`Yb`c`XYf`gc`[`Uf`Hc`XYgZ`A``Y`ni`f
 :`c`[`Y`\`UVYb`"⊕`a` `X`f`&`\$`&`&`[`UV`Y`g`Ui`h`GhUh]gh`U`fi`b`X`&`z`*`A`"]`cb`Yb
dc`]nY"]`W`Yf`ZU`gghY`J`Yf`_Y`\f`gi`b`Z`A``Y`z`k`c`VY]`Y`hk`U`"``\$`+`"\$`\$`\$`X`Uj`cb
ni`DYfgcbYbgW`A`XYb`Z`\`fhYb`"8]Y`g`j`YfXYi`h]W`h`X]Y` ;`Y`ZU`\fYb`z
XYbYb`]bgVYgcbXYfY`A`chc`ff`UX`ZU`\fYf`a` `GhfU`»`Ybj`Yf`_Y`\f
Ui`g[`YgY`hnh`g]bX`"A`chc`ff`UX`ZU`\fYf`a` `UW`Yb`X`UVY]`Y]bYb
VYXYi`hYbXYb`5b`hY]`XYf`g`W`k`Yf`j`Yf`Y`hnhYb`J`Yf`_Y`\f`ghY]`bY`\`a`Yf
Ui`g`"@`Ui`h`XYa` ` ;`YgUa`hj`YfV`UbX`XYf`8Yi`hgW`Yb
J`Yfg]W`Yfi`b`[`gk`]fhgW`U`Z`h`f`l`8`J`L`g]bX`A`chc`ff`A`XYf`a` `J`Yf`[``Y]W`ni
D`_k` `Ø`VYfd`f`c`d`c`f`h]cb`U`Ub`g`W`k`YfYb`l`b`Z`A``Y`b`V`Y`hY"][`h`"

9]b`k`YgYb`h]W`Yf` :`U`_`hc`f`V`Y]`gc`W`Yb`i`l`b`Z`A``Y`b`]gh`X]Y`G]W`hV`Uf`_Y]h`"
J`]Y`Y`A`chc`ff`UX`i`b`Z`A``Y`d`U`gg]YfYb`Ub`?`fYi`ni`b`[`Yb`z`k`c`5i`hc`ZU`\fYf
c`Zi`G`W`k`]Yf][`_Y]hYb`\`UVYb`z`A`chc`ff`UX`ZU`\fYf`fY`W`h`nY]h][`ni
Yf`_Y`bb`Yb`"Ni`XYa`gd]Y`Yb` ;`YgW`k`]bX][`_Y]hgØVYfhfYhi`b`[`Yb`i`bX
XUg` :`U`\fYb`i`bhYf`9]b`Zi`gg`j`cb`5`_c`\c`c`XYf`8`fc`[`Yb`\`A`i`Z][`Y]bY
F`c`"Y`"8]Y`9`f`\`Ø`i`b`[`XYf`J`Yf`_Y`\f`gg]W`Yf\Y]h`i]gh`X`U`\Yf`Y]bY
nYbhfU`Y`<`YfUi`g`Zc`f`X`Yfi`b`[`ZØ`f`X]Y`J`Yf`_Y`\f`gdc`]h]_`]b`8Yi`hgW`UbX`"

:`U`\f`j`Yf`\`U`hYb`i`b`X`G]W`Yf\Y]hggW`i`i`b`[`Yb`

8 Ug : U\ fj Yf\ U`hYb`j cb`A chcffUXZU\ fYfb`\ Uh`i ba`]hY`VUFY
5i gk]f_i b[Yb`Ui Z`X]Y`I bZU``nU\`Yb``J]Y`Y`A chcffUXZU\ fYf`k YfXYb
]b`G]W\ Yf\ Y]hghfU]b]b[g`[YgW\ i`hž`X]Y`XUFUi Z`UVn]Y`Ybž`X]Y
: U\ f_ØbghY`ni`j YfVYggYfb`i bX`XUg`F]g]_cVYk`i gghgY]b`ni
Yf\ Ò\ Yb``Gc`W\ Y`HfU]b]b[g`VY]b\ U`hYb`\`Äi Z][` , Vi b[Yb`ni f
f]W\ h][Yb`?i fj YbZU\ fhž`6fYa`g!`i bX`5i gk Y]W\ a`UbØj Yfb`gck]Y`ni f
9]bgW\ Ähni b[`j cb`J Yf_Y\ fgg]hi`Uh]cbYb`"

B UW\`5b[UVYb`XYg`6i bXYga`]b]ghYf]i a`g`ZØf`J Yf_Y\ f`i bX`X][`]hU`Y
≠ZfUghfi`_hi`f`f`b`A`J`≠`]gh`X]Y`HY`]bU\`a`Y`Ub`gc`W\ Yb`HfU]b]b[g
XYi`h`]W\`[Ygh]Y[Ybž`k Ug`dcg]h]j`ni`XYb`6Ya`Ø\`i b[Yb`VY]hfÄ[hž`X]Y
I bZU``nU\`Yb`ni`gYb_Yb``8Yb`bcW\`[]Vh`Yg`k`Y]hYf\]b`6YXUfZž`X]Y
G]W\ Yf\ Y]h`Ui Z`XYb`GhfU» Yb`Xi`fW\`[]Yn]Y`hY
5i Z_`Äfi b[g_Ua`dU[bYb`ni`ZØfXYfbž`gck`c\`ZØf`A`chcffUXZU\ fYf
U`g`Ui`W\`ZØf`UbXYfY`J Yf_Y\ fghY`]bY\`a`Yfž`i`a`Y]b`VYggYfYg
J YfghÄ`b`Xb]g`ZØf`X]Y`DfcV`Ya`Y`i bX`6YXØfZb]ggY`j`cb
A`chcffUXZU\ fYfb`ni`gW\`UZYb`"

F Y`Yj`Ub`hY`fY`W\`h`]W\`Y`5gdY`_hY`b`UW\`Y`]b`Ya` I`b`ZU``

B UW\`Y]b`Ya`J Yf_Y\ fgi`bZU``k]Y`XYa`]b`BYi`gg[YgW\`]XYfhYb`g]b`X
gck`c\`fYW\`h`]W\`Y`U`g`Ui`W\`j`Yfg]W\`Yfi`b[ghYW\`b]gW\`Y`5gdY`_hY`ni
VYUW\`hYb``8]Y`Dc`]nY`]YfghY``h]b`XYf`F`Y[Y`Y]b`Yb`I`bZU``VYf]W\`hž
XYf`ZØf`X]Y`I`bZU``j`Yfg]W\`Yfi`b[`i`bX`Yj`Ybhi`Y``Y
GW\`UXYbgfY[i`]Yfi`b[Yb`k`]W\`h][`]gh``8]Y`<UZh`i`b[`k`]fX`c`Zha`U`g
Ub\`UbX`XYf`J`c`fZU\`fhgfY[Y`i`b[`gck`]Y`UbXYfYf`J`Yf_Y\`fgfY[Y`b
VYgh]a`a`h`"

6Yhfc`ZYb`Y`gc``hYb`] \fY`5bgdfØW\`Y`Ui`Z`GW\`UXYbgYfgUhn`dfØZYb`"
8Uni`[Y\`ÒfYb`VY]gd]Y`gk`Y]gY`a`YX]n]b]gW\`Y`?`cghYbž
J`YfX]YbghUi`gZU``i`bX`XYf`9fgUhn`ZØf`VYgW\`ÄX][`hY` : U\`fnYi`[Y`"
: UW\`Ub`k`Ä`hY`ZØf`J`Yf_Y\`fgfYW\`h`_Øb`b`Yb`\`]Yf`k`Yfhj`c``Y
I`bhYfghØhni`b[`V]Y`hYb`"

8 Ug`J`Yf_Y\`fgfYW\`h]b`8Yi`hgW\`UbX`]gh`gY\`f`_ca`d`Yi`ž`i`bX`[YfUXY
VY]`I`bZÄ``Yb`a`]h`DYfgcbYbgW\`ÄXYb`_Ubb`Yg`ni`_Ub[`k`]Yf][`Yb
Dfc`nYggYb`_ca`a`Yb``8U\`Yf`]gh`Yg`fUhgUa`ž`g]W\`X]fY`_h`b`UW\`Y]b`Ya`

I bZU`´´† f]gh]gW`VYfUhYb`ni`´´UggYbž`i a`´X]Y`F`YW`hY`XYf`6YhY`][hYb
ni`´k U`fYb`"

: Un]h`i bX`5i gV`]W`

8]Y`9f`\`0`i b[´´XYf`J`Yf`_`Y`f`g]W`Yf`Y`h`i bX`X]Y`GYbg]V`´]g]Yfi b[
U`Yf`J`Yf`_`Y`f`ghY`´bY`a`Yf`g]bX`i`bYf`Àgg`]W`ž`i a`´X]Y`5bnU`´´XYf`
I bZ`A`´´Y`ni`´gYb`_`Yb`"A`]h`ghY`][YbXYb`HY`´bY`a`Yf`fUhYb`Ub`
G]W`Yf`Y`hg`_`i`fgYb`i`bX`a`Y`f`5i`Z`_`Àfi b[´´ØVYf`XUg`J`Yf`U`hYb`´]a`
GhfU`»`Ybj`Yf`_`Y`f`_`0bbYb`´:`cfhgW`f]hhY`Yfn]Y`h`k`YfXYb`"8]Y`
B`c`h`k`YbX`][`_`Y]hž`X]Y`G]W`hVUf`_`Y]h`j`cb`A`c`h`c`f`f`U`X`Z`U`f`Y`f`b`ni`
j`Yf`V`Y`gg`Y`f`b`i`bX`X`Y`f`Y`b`G]W`Yf`Y`h`ni`´Z0fXYfbž`V`Y]Vh`´Y`X`c`W`´Y]bY`
gh`À`b`X`][`Y`<`Y`f`Ui`g`Z`c`f`X`Y`fi`b[´´"´I`a`´X]Y`g`Y`D`f`c`V`Y`a`Y`Y`f`Z`c`´[`f`Y]W`
Ubni`[`Y`Y`b`ž`g]bX`Y]b`Y]h]W`Y`5`b`g`h`f`Y`b`[`i`b[`Y`b`j`cb`´:`U`f`Y`f`b`ž`
J`Y`f`_`Y`f`g]W`Yf`Y`hg`c`f`[`Ub]gUh]cbYb`i`bX`X`Y`f`D`c`´]h`_`b`c`h`k`YbX`][`"

8YhU]`g`

6Ygi W`X`Y`b`G]Y`i`b`g`U`i`Z`´b`!`U`[`"XY`