

DfÀg]XYbh'DYhfc`j`YfhY]X][h
8Yb_a U`gWxi hn'XYg'GUb`đ Ub'XY'8]cg
<cgd]hU`g

DfÀg]XYbh'DYhfc`j`YfhY]X][h'X]Y'9bhgWY]Xi b[`ni f`Ni _i bZh
XYg'?fUb_Yb\Ui`gYg'GUb`đ Ub'XY'8]cg]b`6c[ch½i bX'VYhcbh
[YgYhn`]WY'5gdY_hY"

⇒a`F U\`a Yb`Y]bYf`ØVYffUgWYbXYb'9bhgWY]Xi b[`Uh'X]Y`Gi VfYX
7Ybhfc`Cf]YbhY`XYb`J`YfhfU[`ni f`FYghUi f]Yfi b[`XYg`Ub[YgY\YbYb
<cgd]hU`g`GUb`đ Ub'XY'8]cg]b`6c[ch½[Y_ØbX][h"8]YgY
A U»bU\`a Y`k i fXY`Ua`&&"5i [i gh&\$&(`cZZ]n]Y`VY_Ubbh[Y[YVYb
i bX`k]fZh'nU\`fY]WY`: fU[Yb`ØVYf`X]Y`ni _ØbZh][Y`Bi hni b[`XYg
\]ghcf]gWYb`; Ygi bX\Y]hgnYbhfi a`g`Ui Z"

Ni`XYb`<][\`][\hg`X]YgYf`9bhk]W_`i b[`[Y\Øfh'X]Y`FYU_h]cb`j`cb
DfÀg]XYbh; i`ghUj`c`DYhfc`ž`XYf`g]W`i`bY]b[YgWfÀb_h`\]bhYf`X]Y
9bhgWY]Xi b[`[YgY`h`h`Uh"9f`VYhcbhž`XUgg`XUg`?fUb_Yb\Ui`gž
k`Y`WYg`Ui`Z[fi bX`gY]bYg`_i`hi`fY`Yb`9fVYg`i`bX`gY]bYf
\]ghcf]gWYb`6YXYi`hi`b[`U`g`k]W]h[Yg`9fVY`XYf`BUh]cb`[`]hž`b]W]h
XYa`c`]Yfh`k`YfXYb`gc`""DYhfc`Yf]bbYfh`XUfUbž`XUgg`Yf`Ub`XYf
; YgYhn[YVi`b[`a`]h[Yk]f_h`\Uhž`X]Y`XYb`GW`i`hn`gc`WYf
9]b]W]hi`b[Yb`fY[Y`h" `Gc`Yf`_`ÀfhY`Yf`]b`Y]bYa`gc]n]U`Yb
BYhmk`Yf`Ub`hfU[ž`XUgg`]b`XYf`; YgYhn[YVi`b[`b]W]hj`cb
8Ya`c`]Yfi`b[`cXYf`J`YfgW]k]bXYb`X]Y`FYXY`]gh`"

Dc`]h]gWY`?`cbhfcj`YfgYb`i`bX`K]XYfghUbX

8]YgY`GhUhYa`Ybh'gh]Y»`YXcW`Ui`Z`gW`UfZY`?f]h]_`"⇒gVYgcbXYfY
X]Y`GYbUhc]b`A`UfÉU`:`YfbUbXU`7UVU`"Ài`»YfhY`g]W`j`Y\Ya`Ybh"⇒b
Y]bYa`ÒZZYbh]WYb`5i`Zfi`Z`Ui`Z`XYf`D`Uhhžcfa`L`ghY`hY`g]Y`X]Y
J`YfZUggi`b[ga`À»][`_Y]hj`cb`DYhfcg`J`cf[Y\Yb`]b`:`fU[Y`i`bX`k`UfZ

]\a`j cfz`X]Y`F YW\hY`XYf`c_U`Yb`6Y\OfXYb`ni`j Yf`YhnYb`" `Af
Zc`[hYb`\YZh][Y`K cfhYž`U`g`g]Y`Uf[i`a`Ybh]YfhYž`XUgg`X]Y
9bhgW\Y]Xi`b[`VY]`k`Y]hYfYb`fYW\h]W\Yb`5i`gY]bUbXYfgYhni`b[Yb
ZOf`XYb`GhUUh`7c`ca`V]U`a`O[`]W\Yfk`Y]gY`gW\k`Yfk`]Y[YbXY
Z]bUbni]Y`Y` :`c`[Yb`\ÄhhY`" `DYhfc`a`UW\hž`k`Ug`Yf`k`]"`i`bX`j`Yf`Yhnh
XUXi`fW`X]Y`J`YfZUggi`b[`ž`gW\f]YV`g]Y`i`bX`ZcfXYfhY`Y]bY`?`Äfi`b[
XUfØVYfž`k`Yf`X]Y`Z]bUbni]Y`Yb`?`cbgYei`YbnYb`hfU[Yb`k`ØfXYž`k`Ybb
g]W\`X]Y`G]hi`Uh]cb`j`YfgW\`YW\hYfh`"

Ni`gÄhn`]W\`Äi`»`YfhY`Ui`W\`XYf`6Øf[Yfa`Y]ghYf`j`cb`6c[ch`ž`7Uf`cg
 :`YfbUbXc` ;`U`ž`b`ž`gY]bY`6Ygcf[b]g`"9f`VYnY]W\`bYhY`X]Y`?`ØbX][i`b[
XYg`J`YfhfU[Yg`U`g`dchYbn]Y`Yg`F]g]_c`ZOf`X]Y`bUh]cb`U`Y
 ;`Ygi`bX\Y]hg]Yfgcf[i`b[`i`bX`\cV`\Yfj`cfž`XUgg`XYf`9f`U`h`XYg
 ?`fUb`_`Yb`\`Ui`gYg`Y]bY`nYbhfU`Y`Df]cf]hÄh`gY]bYf`5Xa`]b]ghfUh]cb`gY]"
 8]Y` ;`Ygi`bX\Y]h`XYf`6Øf[Yf`a`i`gg`Ub`YfghYf`GhY`Y`ghY`\Yb`ž
VYhc`b`hY`Yf`]b`Y]bYa`]X]Ycž`]b`XYa`Yf`gY]bYb`i`ba`i`h`ØVYf`X]Y
9bhgW\Y]Xi`b[`ni`a`5i`gXfi`W`_`VfUW\hY`" ;`U`ž`b`k`]Yg`XUfUi`Z`\]bž
XUgg`XUg`J`cf[Y\Yb`XYf`F`Y[]Yfi`b[gVY\OfXY`X]Y`6Ya`Ø`i`b[Yb`ni`f
K]YXYf\YfghY`i`b[`XYg`J`YfhfU[Yg`i`bhYf[fUVY`i`bX`a`Y`f` :`fU[Yb
Ui`Z`k`YfZYž`U`g`Yg`5bhk`cfhYb`[YVYb`_`ÖbbY`"

9g`]gh`k`]W\h][`ni`VYUW\hYbž`XUgg`X]Y`9bhgW\Y]Xi`b[ž`XUg`Dfc`Y`_`hni
`]ei`]X]YfYbž`b]W\hY]bZUW\`[Yhfc`ZYb`k`i`fXY`"9]bY` ;`fi`ddY`j`cb
9i`dYfhYb`\UhhY`ZYgh[YghY`hž`XUgg`VYgh]a`a`hY`9`Ya`Yb`hY`XYg
nYbhfU`Yb`?`ca`d`Yi`Yg`b]W\h`HY]`XYf`\]ghcf]gW\Yb`Ghfi`_`hi`f`g]bXž
X]Y`XYf`F`Y[]Yfi`b[`U`g`gW\ØhnYb`gk`Yfh`YfgW\Y]b`h`"8]Yg`\Uh`ni
Y]bYa`_`ca`d`Yi`Yb`F`YW\hg`_`cbZ]_`h[YZØ`fhž`XYf`g]W\`ØVYf`a`Y`fYfY
»\fY`\]bn]Y`h`i`bX`Xi`fW`X]Y`i`b[YfY]a`h\Y]hYb`VY]`XYf
J`Yfk`U`hi`b[`XYg`Dfc`Y`_`hg`bcW\`j`YfgW\`ÄfZi`k`]fX`"

8 Yf`K`Y[`bUW\`j`c`f`b`

Hfchn`XYf`<`YfUi`gZcfXYfi`b[Yb`[`Ui`Vh`DfÄg]XYbh`DYhfc`ž`XUgg`X]Y
Ni`_`i`bZi`XYg`?`fUb`_`Yb`\`Ui`gYg`[Yg]W\Yfh`]gh`"9f`\`Uh`_`Uf`[Ya`UW\hž
XUgg`gY]bY`F`Y[]Yfi`b[`X]Y`[YgYhn`]W\Yb`J`cf[UVYb`fYgdY`_`h]YfYb
i`bX`U`Y`bchk`YbX][Yb`GW\f]hY`ni`f`K]YXYf\YfghY`i`b[`i`bX`ni`a
K]YXYfVYhf]YV`XYg`?`fUb`_`Yb`\`Ui`gYg`i`bhYfbY`a`Yb`k`]fX`" `K]f
k`YfXYb`i`bg`b]W\h`XYf` ;`YgYhn[YVi`b[`k`]XYfgYhnYb`ž`j`Yfg]W\YfhY`Yf`

]b`Y]bYf`9f_`Àfi b["

8]Y`GW UZI b[`Y]bYg`bUW\`U`h][Yb`D`Ubg`ni f`K]YXYfVY`YVi b[`XYg
GUb`đ Ub`XY`8]cg`\`Uh`b]W`h`bi f`a YX]n]b]gW`Y`ž`gcbXYfb`Ui W`
_i`hi fY`Y`6YXYi hi b["8Ug`?`fUb`_Yb`Ui`g`]gh`Y]b`K U`fnY]W`Yb`j`cb
6c[ch½i bX`HY]`XYg`gh`Xh]gW`Yb`9fVYg"8Yf`J`Yf`i gh`X]YgYf
`gh]hi`h]cb`k`ØfXY`b]W`h`bi f`X]Y`a YX]n]b]gW`Y`J`Yfgcf[i b[`]b`XYf
FY[]cb`VYY]bZi ggYb`ž`gcbXYfb`Ui W`XUg`_i`hi fY`Y` ; YX`W`hb]g`XYf
GhUXh[YZ`A`fXYb"

`b`XYf`[YgUa`hYb`8]g_i`gg]cb`ZU`Yb`Ui`W` : fU[Yb`ni f`Z]bUbn]Y`Yb
J`YfUb`nk`cfhi b[`i bX`XYf`5i`ZhY]i b[`XYg`F]g]_cgž`]bgVYgcbXYfY`ja
<]bV`]W`_Ui`Z`X]Y`J`YfY]bVUfi b[Yb`a`h`XYa`_Ui`g`AbX]gW`Yb
6Ui`i`bhYfbY`a`Yb`7cgUdU"8]YgY`H`Ya`Uh]_`V`Y]Vh`Y]b`Y`Y]»
X]g_i`h]YfhYg`H`Ya`U`gck`c`Y`]b`XYf`dc`]h]gW`Yb`U`g`Ui`W`]b`XYf
ÖZYb`h]W`Yb`Gd`A`fYž`XU`g]W`X]Y`5i`gk`]f_i`b[Yb`Ui`Z`X]Y`?`UggYb
XYf`6Øf[Yf`dchYbn]Y`ghUf`_Ui`Z`X]Y`GhYi`YfnU`Yf`Ui`gk`]f`_Yb
_ÖbbhYb"

8]Y`G]hi`Uh]cb`i`a`XUg`?`fUb`_Yb`Ui`g`GUb`đ Ub`XY`8]cg`]gh`U`gc`k`Y]h
a`Y`f`U`g`bi`f`Y]b`?`cbZ]_hi`a`Y]bYb`6Ui`j`YfhfU["G]Y`fYZY`_h]Yfh`X]Y
h]YZb`GdUbbi`b[Yb`nk`]gW`Yb`XYf`bUh]cbU`Yb`i`bX`XYf`c`_U`Yb
9VYbY`]b`?`c`i`a`V]Ybž`k`A`fYbX`XYf`

Dc`h]gW`Y`i`bX`k`]fhgW`UZh`]W`Y`?`cb`hYI`hY

8]Y`8]g_i`gg]cb`i`a`XUg`?`fUb`_Yb`Ui`g`GUb`đ Ub`XY`8]cg`]gh`b]W`h
bi`f`Y]b`c`_U`dc`]h]gW`Yg`H`Ya`U`ž`gcbXYfb`gd]Y[Y`h`h]YZYf`Y[YbXY
dc`]h]gW`Y`i`bX`k`]fhgW`UZh`]W`Y`Ghf`Òa`i`b[Yb`]b`?`c`i`a`V]Yb`k`]XYf"
8Ug`?`fUb`_Yb`Ui`gž`XUg`ni`XYb`Y`]ghcf]gW`VYXYi`hYbXghYb
; YV`Ai`XYb`XYg`@UbXYg`n`A`hž`Y]XYhi`bhYf`XYa`GdUbbi`b[gZY`X
nk`]gW`Yb`8Yb`_a`U`gW`i`h`ni`bX`XYb`6YXØfZb]ggYb`XYf`a`cXYfbYb
; Ygi`bX`Y]hgj`Yfgcf[i b["

8]Y`dc`]h]gW`Yb`<]bhYf[fØbXY`g]bX`Yb[`j`Yf`_bØdZh`a`]h`XYf
; YgYhn[YVi`b[`i`a`XUg`?`i`hi`fYfVY`gck`]Y`XYf`; Ygi`bX`Y]hgfYZcfa`ž
X]Y`]b`XYb`Y`hnhYb`đ`fYb`]b`?`c`i`a`V]Yb`]a`a`Yf`k`]YXYf`Ui`Z`XYf
HU[YgcfXbi`b[`ghY`h"8]Y`9bhgW`Y]Xi`b[ž`XYb`J`YfhfU[`a`]h`XYf

gdUb]gWYb':]fa U'7cgUdU'ni 'VYYbXYbž'nY][hž'k]Y'gWk]Yf]['Yg
]ghž'XUg'; 'Y]W [Yk]W'h'nk]gWYb' [YgYhn']WYb' J cf[UVYb'i bX
dfU[a Uh]gWYb'i a gYmi b[ga Ò['W_X]hYb'ni 'Z]bXYb'"8 UfØVYf
\]bUi g']gh'XYf'; Ygi bX\Y]hggY_hcf']b'?c'i a V]Yb'cZhiUb'XYf'? UbhY
XYf'Z]bUbn]Y''Yb'; Ygi bX\Y]hž'k Ug'ni gÀhn']WY'?ca d']_Uh]cbYb'a]h
g]W 'Vf]b[h"

Ni gÀhn']W 'gh'X]Y'?f]h]_ž'X]Y'X]Y'FY []Yfi b['DYhfc'VYnØ['W'XYf
9bhgWY]Xi b['ja 'l a [Ub['a]h'GUb'ž Ub'XY'8]cg'Yf\À'hž'HY]'Y]bYf
VfY]hYfYb'8YVUhY'ØVYf'X]Y'5i hcbca]Y'XYf'c_U'Yb'FY []Yfi b[Yb
[Y[YbØVYf'XYa 'B Uh]cbU'ghUUh'"8]YgY'GdUbbi b[Yb'g]bX'']b'XYf
_c'i a V]Ub]gWYb'Dc'h]_b]W'h'bYi ži bX'g]Y'k YfZYb': fU[Yb'Ui Ž
k]Y'FYggci fW'b'Ua 'YZZ_h]j ghYb'j Yfk U'hYh'k YfXYb' _ØbbYb'ž'i a
XYb'6YXØfZb]ggYb'XYf'6Øf[Yf' [YfYW'h'ni 'k YfXYb"

2 ZZYbh']WY'A Y]bi b['i bX'FYU_h]cbYb

8]Y'FYU_h]cbYb'Ui ZX]Y'9bhgWY]Xi b[Yb'VYnØ['W'XYg
'fUb_Yb\Ui gYg'g]bX'j]Y'ZÀ'h]['i bX'fY]WYb'j cb'l bhYfghØhni b['V]g
\]b'ni '\YZh][Yf'?f]h]_'l a ZfU[Yb'i bX'Ghi X]Yb'nY][Ybž'XUgg'XUg
J YfhfUi Yb'XYf'6Øf[Yf']b'X]Y'dc'h]gWYb' bgh]hi h]cbYb']b
'c'i a V]Yb'UV[Ybca a Yb'\Uhž'k Ug'g]W'Ui W'j]b'XYf'U_hi Y''Yb
8YVUhY'k]XYfgd]Y['h"

9]b][Y'6Øf[Yf'i bX': UW'Yi hY'i bhYfghØhnyb'X]Y'9bhgWY]Xi b['j cb
DfAg]XYbh'DYhfcž'XU'g]Y'X]Y'fYW'h']WYb'i bX'_i 'hi fY''Yb'5gdY_hY
XYg'?fUb_Yb\Ui gYg'i bhYfghfY]WYb'"8U[Y[Yb'k UfbYb'?f]h]_Yfž
XUfi bhYf'Ui W'Dc'h]_Yf'k]Y'A UfÉ': YfbUbXU'7UVU'ž'XUgg'X]Y
9bhgWY]Xi b['Ub[Zf]gh][Y'k]fhgWUZh']WY': c'[Yb'\UVYb'_ØbbhY"
l a ZfU[Ybž'X]Y'j cf'XYf'9bhgWY]Xi b['Xi fW [YZØ\fh'k i fXYbž
nY][Yb'Y]b'[YgdU'hYbYg'6]X.'K À\fybX'Y]b'HY]'XYf'6Yj Ò'_Yfi b[
X]Y'\]ghcf]gWY'6Yk U\fi b['i bX'XYb'_i 'hi fY''Yb'K Yfh'j YfhY]X][hž
VYZØfW'hYb'j]Y'Yž'XUgg'X]Y'?ca d'Yi]hÀh'XYf'G]hi Uh]cb'ni 'k Y]hYfYb
'cbZ]_hYb'ZØ\fyb'_ØbbhY"

8]Y'Gcf[Yb'ØVYf'Z]bUbn]Y''Y'<UZh' b[Yb'Xi fW'a Ò['W'XY'?`U[Yb
i bX'X]Y': fU[Yž'k Yf'X]Y'A]hY''ZØf'Yj Ybhi Y''Y'GW'ÀXYb'Ui ZVf]b[hž
'UggYb'XYb'8]g_i fg'i a 'GUb'ž Ub'XY'8]cg'k Y]hYf\]b']bhYbg]j 'i bX

_c b h f c j Y f g Y f g W X Y] b Y b " ' 8] Y ' 6 Ø f [Y f ' Z f U [Y b ' g] W X ž ' k] Y ' X] Y
J Y f U b h k c f h] W X Y b ' X] Y ' Z] b U b n] Y ' ' Y ' ð h Y [f] h Å h ' X Y g ' G h U U h Y g ' g] W X Y f b
_ Ò b b Y b ž ' c \ b Y ' X U V Y] ' X] Y ' ; Y g i b X \ Y] h g j Y f g c f [i b ['] \ f Y f ' A] h V Ø f [Y f
n i ' [Y Z Å \ f X Y b "

8 Y h U] ' g

6 Y g i W X Y b ' G] Y ' i b g ' U i Z ' b ! U [" X Y