

GhY]b_Ui n!Dfc ^Y_h']b '< Y]XY`VYf[.
9fZc`[fY]WXY`F ØW__Y\ f`XYf`9i `YbUfh

9]b`5fhYbgWxi hndfc ^Y_h']b`XYf`A Yhfc dc`fY[]cb`< Y]XY`VYf[
ZØ\fh'ni `FY`cfXnU\`Yb`VY]`GhY]b_Äi nYb.`J cb`%`Ui Z`%\$
6fi hdUUfY`]b`j`Yf`š\`fYb`

⇒ `F\Y]b!BYW_Uf!FUi a `Uhg]W`Y]b`VYa Yf_Ybgk YfhYf`K UbXY`
j c`nc[Yb.`8]Y`Dcdi `Uh]cb`XYg`GhY]b_Ui nYgž`Y]bYf`_`Y]bYb
9i `YbUfhž`X]Y`j cf`Y]b][Yb`š\`fYb`j ca `5i gghYfVYb`VYXfc`h`k Ufž
Yf`YVh`Y]bY`VYk Y[YbXY`F ØW__Y\ f`8Ub`_`XYg`5fhYbgWxi hndfc ^Y_hg
; Ya Y]bgUa `ZØf`XYb`GhY]b_Ui n ž`XUg`j cb`c`_`U`Yb
BUhi fgWxi hnj YfvÄbXYb`gck]Y`XYa `Ncc`< Y]XY`VYf[`]bg`@YVYb
[Yfi ZYb`k`i fXYž`_`cbbhYb`]b`X]YgYa `š\`f`a`]bXYghYbg`nY\`b
6fi hdUUfY`(+`š`b[h]YfY`[fc»n]Y\`Yb`8]Yg`]ghY]b`VYY]bXfi W_YbXYg
9f[YVb]gž`VYgcbXYfg`k Ybb`a Ub`VYXYb_hž`XUgg`]a `š\`f`&\$&\$`bi f
Y]b`Y]bn][Yg`6fi hdUUf`]b`XYf`FY[]cb`VY`Ubbh`k Uf`

8]Y`Gcf[Yb`i a `XUg` , VYf`YVYb`XYg`GhY]b_Ui nYg`k UfYb`]b`XYb
`YhnhYb`š\`fYb`[fY]ZVUF`⇒ `š\`f`&\$&\$`gU\`a Ub`X]Y`5fh`]b`XYf
FY[]cb`ZUgh`j YfgWk`]bXYb`"I a `XYb`6YghUbX`XYg`GhY]b_Ui nYg`ni
ghUV`]g]YfYbž`gW`cggYb`g]W`nU\`fY]WXY`C f[Ub]gUh]cbYb
ni gUa a Yb`"I bhYf`XYf`@Y]hi b[`j cb`A]WXY`N]UfUž`XYa
J cfg]hnYbXYb`XYg`6I B8`C fhgj YfvUbX`8cggYb\`Y]a ž`Yb[U[]YfYb
g]W`XYf`Ncc`< Y]XY`VYf[`gck]Y`nU\`fY]WXY` ; fi ddYb`XYg`6I B8
i bX`B56I ži a `X]Y`5fh'ni `fYhhYb`i bX`]\`f` , VYf`YVYb`ni `g]WXYfb`

9fZc`[fY]WXY`5i gk]`XYfi b[`i bX` : c f g W x i b [

9]bY`d cg]hj`Y` , VYffUgWxi b[`[UV`Yg`_Øfn`]W`]b`Y]bYf`XYf
B]gh\`]ZYb.`?i fn`j cf`XYf`6fi hnY]h`Yb`hXYW`hYb`X]Y`6YhfYi Yf`Y]b
GhY]b_Ui nk Y]VWXYbž`k Y`WXYg`]a `j Yf[Ub[YbYb`š\`f`U`g`BYgh`]b[`]b

X]Y': fY\Y]h'Ybh'UggYb'k i fXY"8]Yg'nY][h'Y]bXfi W_gj c`ž'XUgg'X]Y
gdYn]Y`Y'5i gk]'XYfi b[ga Yh\cXY'XYg'Dfc'Y_hg'K]f_i b['nY][h"÷
X]YgYa ÷\f'k i fXYb']bg[YgUa h(\$ ÷ b[h]YfY'VYf]b[hž'i bX'XYf
5bgh]Y['XYf'6fi hdUUfY'k]fX'hY]'k Y]gY'Ui Z'Y]b'fY]WXYg
BU\fi b[gUb[YVchž']bgVYgcbXYfY'Ub'A Āi gYb'i bX'A U]_ÄZYfbž
ni fØW_[YZØ\fh"

8]Y'YfghYb'K]YXYfZi bXY'j cb'GhY]b_Äi nYb'Ui g'XYb'`YhnhYb'÷\fYb
g]bX'VYgcbXYfg'k Yfhj c`ZØf'X]Y'K]ggYbgWÅUZh"8]YgY
6YcVUWÅhi b[Yb'`]YZYfb'k]WÅh][Y'9f_Ybbhb]ggY'ØVYf'XUg
A][fUh]cbgj Yf\U'hYb'gck]Y'X]Y'6fi hcdi `Uh]cb'XYf'5fh"i bhYf'XYb
k]YXYfYbhXYW_hYb'H]YfYb'VYZUbX'g]WÅ'Ui WÅ'Y]b'K Y]VWÅYb'j ca
Ncc'<Y]XY'VYf[ž'XUg'g]WÅ'bi f'k Yb][Y'A YhYf'j cb'gY]bYa
i fgdfØb[`]WÅYb'B]gh\]'ZYbghUbXcfh'b]YXYf'Y»'i bX'YfZc`[fY]WÅ'j]Yf
÷ b[h]YfY' [fc»nc["8]YgYf': cfhgWÅ f]hh']gh'VYgcbXYfg'VYXYi hYbX'ZØf
X]Y' [YbYh]gWÅY'j]Y'ZU'h]b'XYf'F Y[]cbž'X]Y']b'XYb'`YhnhYb'÷\fYb
ghUf_[YZÅ\ fXYh'k Uf"

8]Y'6YgcbXYf\Y]h'XYg'Dfc'Y_hg`Y[h']b'XYf'gc[YbUbbhYb
Gi dd'Ya Ybh]Yfi b["8UVY]'k YfXYb']a 'Ncc'[YgWÅ'ØdZhY'÷ b[j Ò[Y'ž
VYfY]hg]ja '5'hYf'j cb'XfY]'K cWÅYbž']b'BYghYf'j cb'k]'X'YVYbXYb
GhY]b_Äi nYb' [YgYhnhž'X]Y'bi f'k Yb][Y'B UWÅk i WÅg'YfZc`[fY]WÅ
[fc»[Ync[Yb'\UVYb"5i Z'X]YgY'K Y]gY'k UWÅgYb'X]Y'BYgh]b[Y
X]fY_h]b']\fYa '_ØbZh][Yb'@VYb'gfu' a'Ui Zi bX'_ØbbYb'gWÅbY`']b
X]Y'K]'Xb]g'Yb'hk]gWÅYb"8]YgY'A Yh\cXY'ZØfXYfh'X]Y' [YbYh]gWÅY
; Ygi bX\Y]h'XYf'Dcdi `Uh]cb'i bX'hfÅ[h'ni f'B UWÅk i WÅgghY][Yfi b[
VY]"

5i gV`]W_ 'Ui Z'X]Y'Ni _i bZh

8Yf'9fZc`[]b'X]YgYa ÷\f'Vf]b[h[fc»Y'j cfZfYi XY'Ui Z'X]Y
_ca a YbXYb'6fi hnY]hYb"Ni a '6Y]gd]Y'k i fXYb']a 'A U]'VYfY]hg'j]Yf
k Y]hYfY'GhY]b_Ui nbYgh]b[Y'Ui g'XYa 'Ncc'YfZc`[fY]WÅ']b'X]Y
K]'Xb]g'Yb'h'UggYb"9g']gh'Ubni bY\ a Ybž'XUgg'X]YgY'H]YfY']b']\fYf
YfghYb '@VYb'gnY]h'Y]b'Y][YbYg'F Yj]Yf']b'XYf'B Å\Y']\fYg
; YVi fhcfhg'Ui gk Å\Yb'i bX'g]Y'a Ò[`]WÅYfk Y]gY'VYfY]hg]ja
bÅWÅghYb'÷\f'Y][YbY'6fi hdUUfY'V]'XYb'_ØbbhYb"8Yf'C dh]a]ga i g
]gh'gdØfVuf. '8f"'?`Ui g'K ØbbYa Ubb'j ca 'Ncc'<Y]XY'VYf['Äi »YfhY

g]W\`ghc`n`ØVYf`X]Y`V]g\`Yf][`Yb`9fZc`[`Y.`K`]f`g]bX`ghc`n`ž`ni`f`
GhØhni`b[`X`Yg`6`YghUb`X`Yg`VY][`YhfU[`Yb`ni`'\`UVYb`ž`i`bX`XYf`[`fc`»`Y`
9fZc`[`]b`X]YgYa`'\`f`gh]a`a`h`i`bg`ni`j`Yfg]W`h]W`"

8`Ug`5`fhY`bgW`i`hndfc`Y`_`h`i` ;`Ya`Y]bgUa`'\`ZØf`XYb`GhY]b`_`Ui`n`i`i`bX`X]Y`
XUa`]h]YfVi`bXYbYb`9ffi`b[`YbgW`UZhYb`nY][`Yb`ž`k`]Y`YfZc`[`fY]W`
Ni`gUa`a`YbUfVY]h]b`XYf`B`Uhi`fgW`i`hUfVY]h`gY]b`_`Ubb`"8]Y`J]Y`ZU`h`
i`bX`XUg`9b[`U[`Ya`Ybh`j`cb`B`Uhi`fZfYi`bXYb`]b`XYf`F`Y`[`]cb`'\`UVYb`
XYb`GhY]b`_`Ui`n`k`]YXYf`]bg`@YVYb`[`Yfi`Z`b`ž`i`bX`X]Y` ;`YgW`]W`hY`
[`Y`h`k`Y]hYf`"K`Ybb`U`Y`6`YhY][`hYb`Ui`W`k`Y]hYf`]\b`
ni`gUa`a`YbUfVY]hYb`i`bX`Ui`Z`X]Y`6`YXØfZb]ggY`X]YgYf`9i`YbUfh`
UW`hYb`ž`ghY`h`Y]bYf`Ub[`Zf]gh][`Yb`GhUV]`]h`h`X`Yf`
GhY]b`_`Ui`ndcdi`Uh]cb`]b`XYf`A`Yhfcdc`fY`[`]cb`b]W`hg]a`i`K`Y`[`Y`"

8`Yf`GhY]b`_`Ui`n`ž`Ui`W`VY`_`Ubb`h`U`g`5`h`Y`b`Y`bc`Whi`U`ž`]gh`Y]b`Y`
9i`YbUfh`ž`X]Y`VYgcbXYfg]b`c`ZYbYb`@UbXgW`UZhYb`i`bX`
`UbXk`]fhgW`UZh]W`Yb` ;`YV]YhYb`j`cf`_`ca`a`h`i`GY]bY`9i`]ghYbn`]gh`
Xi`fW`X`Yb`J`Yf`i`ghj`cb`@YVYbgf`À`i`a`Yb`ž`]bhYbg]j`Y`@UbXk`]fhgW`UZh`
i`bX`XYb`F`ØW`[`Ub[`]`cb`B`U\`fi`b[`gfYggci`fW`b`Yf`YV`]W`
[`Y`Z`h`f`XYh`8]Y`5`fhY`bgW`i`hndfc`Y`_`hY`k`]Y` ;`Ya`Y]bgUa`'\`ZØf`XYb`
GhY]b`_`Ui`n`g]bX`Yb`hgW`Y]XYbX`ZØf`X]Y`K`]YXYf`YfghY`i`b[`ghUV]`Yf`
Dcdi`Uh]cbYb`i`bX`V]YhYb`k`]W`h][`Y`9f`_`Ybb`hb]ggY`ØVYf`XYb`
Ò`c`c`[`]gW`Yb`Ni`ghUbX`fY`[`]cb`U`Yf`@YVYbgf`À`i`a`Y`"

,`VYf`X]Y`Y`h`hYb`'\`fn`Y`b`hY`g]bX`]b`8`Yi`hgW`UbX`nU`fY]W`Y`
J`cf`_`ca`a`Yb`gY`hYbYf`J`c[`Y`UfhYb`ž`Y]bgW`]Y`»`]W`X`Yg`GhY]b`_`Ui`n`Ygž`
U`Ufa`]YfYbX`ni`fØW`[`Y[`Ub[`Yb`"8`Yf`Ni`k`UW`g`j`cb`(`+`ž`b[`h]YfYb`]b`
X]YgYa`'\`f`nY][`h`Y`X`c`W`X]Y`d`cg]h]j`Y`K`]f`_`i`b[`[`Yn]Y`hYf`
B`Uhi`fgW`i`hna`U`»`b`U`a`Yb`i`bX`X]Y`6`YXYi`hi`b[`]`cb`c`_`U`Yb`
?`ccdYfUh]cbgd`fc`Y`_`hYb`nk`]gW`Yb`B`Uhi`fgW`i`h`j`YfV`Å`b`XYb`i`bX`
ncc`c`[`]gW`Yb`9]bf]W`hi`b[`Yb`"Gc`W`Y`D`fc`Y`_`hY`gh`f`_`Yb`b]W`h`i`bi`f`
X]Y`6`Ygh`Å`b`XY`[`Y`Z`h`f`XYhYf`5`fhYb`ž`gcbXYfb`ZØfXYfb`Ui`W`X`Ug`
6`Yk`i`gghgY]b`XYf`²`ZYbh]W`_`Y]h`ZØf`XYb`B`Uhi`fgW`i`h`n`"

8]Y`F`c`Y`j`cb`B`U`f`i`b[`gfYggci`fW`b`

A`]W`UY`N]UfUž`XYf`J`c`fg]h`Yb`XY`XYg`6i`B`8`C`fhgj`YfV`Ub`Xg`
8`c`ggYb`Y]a`ž`U`h`VYfY]hg`Ui`Z`Y]bYb`GW`ØggY`ZU`hc`f`ZØf`XYb`

5bgh]Y[`XYf`GhY]b_Ui ndcdi `Uh]cb`\]b[Yk]YgYb. `XUg`fY]W\`U`h][Y
BU\fi b[gUb[YVch"8]Y`J YfZØ[VUf_Y]h]j cb`A`Ai`gYb`i`bX`A`U]_`ÄZYfb
k]f`_h]g]W\`X]fY`_h`Ui`Z`X]Y`6`fi`h`i`b`X` , VYf`VYVYbgfUhYb`XYf`J`Ø[Y`
Ui`g`" `⊕`XYb`Y`hnhYb`⊘\`fYb`[UV`Yg`fY[]cbU`Y`J`Yf`Äb`XYfi`b[Yb`]b
XYf`@`Ub`Xk]fhgW\UZh`X]Y`a` Ø[`]W\Yfk`Y]gY`X]Y`@`VYVYbg[fi`bX`U[Yb
ZØf`X]YgY`H]YfY`j`YfVYggYfh`\UVYb"9]b`bUW\`U`h][Yf`l`a` [Ub[`a`]h
`Ub`Xk]fhgW\UZh]W\Yb` : `ÄW\Yb`_`Øb`bhY`Ui`W\`k`Y]hYf\]b`Y]bYb
d cg]hj`Yb`9]bZi`gg`Ui`Z`X]Y`9i`Y`b`d`c`d`i`U`h]c`b`\`UVYb"

Ni`g`Ä`h`n`]W\`_`ca`a`h`XYf`@`VYVYbgfUi`a`g]W\Yfi`b[`Y]bY`nYbhfU`Y`F`c`Y`Y
ni`"8]Y`DZY[Y`j`cb`K`]YgYb`ž`X]Y`G`W\U`Zi`b[`j`cb`H`ch`\`c`n`ghfi`_`hi`fYb
i`bX`X]Y`DZY[Y`j`cb`c`ZY`b`Yb`@`Ub`X`g`W\U`Zh`Yb`ZØf`XYfb`b]W\h`bi`f`X]Y
GhY]b`_`Äi`nY`ž`g`c`b`XYfb`Ui`W\`Y]b`Y`J]Y`n`U\`_`Ub`XYfYf`H]Yf!`i`b`X
DZ`Ub`nYb`Uf`hYb"8i`f`W\`X]Y`l`bhYf`gh`Ø`hni`b[`j`cb`7`ca`a`i`b]h]Yg`i`b`X
@`Ub`Xk]fhYb`k]fX`Y]b`]b`_`i`g]j`Yf`5`bg`U`h`n]a`B`U`hi`fg`W\`i`h`n
Ub[Y`gh`f`Y`V`h"

K]ggYbgW\UZh`]W\Y`6YcVUW\hi`b[Yb`i`bX
ni`_`Øb`Zh][Y`DYfgdY`_`h]j`Yb

8]Y`8`UhYb`ž`X]Y`Xi`f`W\`X`Ug`D`fc`Y`_`h` ; Ya`Y]bg`Ua`_`ZØf`XYb
GhY]b`_`Ui`n` [Yg`Ua`a`Y`h`k`Yf`XYb`ž`g]b`X`j`cb`[`fc`»`Yf`6`Y`X`Y`i`hi`b[`ZØf`
X]Y`C`fb]h`\`c`c[]Y`i`b`X`X`Y`b`5`fh`Y`bg`W\`i`h`n"8]Y`6`Yf]b[i`b[`i`b`X`X`Ug
A`cb]h`c`f]b[`XYf`9i`Y`b`Y`fa`Ø[`]W\Yb`Y`g`X`Y`b` : `c`f`g`W\Y`fb`ž`H`f`Y`b`X`g]`a
A][f`Uh]c`bg]j`Yf`\`U`h`Y`b`i`b`X`J`Y`f`Ä`b`XYfi`b[Yb`]b`XYf`<`UV]h`U`h`bi`h`ni`b[
ni`i`b`h`Y`fg]i`W\Yb"8]YgY`⊕`Z`c`fa`U`h]c`b`Y`b`g]b`X`b]W\h`bi`f`ZØf`X`Ug
J`Y`f`gh`Ä`b`X`b]g`XYf`G`hY]b`_`Ui`nd`c`d`i`U`h]c`b`Y`b`k]W\h][`ž`g`c`b`XYfb`_`Ø`b`Y`b
Ui`W\`Ui`Z`Ub`XYfY`V`Y`X`f`c`\`h`Y`5`fh`Y`b`Ø`V`Y`f`h`f`U[Yb`k`Yf`XYb"

: Øf`X]Y`Ni`_`i`b`Zh]g]b`X`X]Y` : `c`f`h`g`W\`f]h`hY`X`Y`g`5`fh`Y`bg`W\`i`h`n`d`f`c`Y`_`hg
\`c`Z`Z`bi`b[`g]j`c`""8`Yf`l`a` [Ub[`a`]h`X`Y`b`<`Yf`Ui`g`Z`c`f`X`Y`fi`b[Yb`X`Y`f
6]c`X]j`Y`fg]h`Ä`h`k]f`X`Y`b`h`g`W\`Y]X`Y`b`X`g`Y]b`ž`i`a`_`Ub[`Zf]g`h][`gh`UV]`Y
J`c[Y`d`c`d`i`U`h]c`b`Y`b`ni` [Yk`Ä`\`f`Y]g`h`Y`b"Ä`h`X`Y`f`l`bh`Y`f`gh`Ø`h`ni`b[`X`Y`f
6`Y`j`Ø`_`Y`fi`b[`i`b`X`X`i`f`W\`_`f`Y`U`h]j`Y`A`Ub`U[Ya`Y`b`h`g`h`f`U`h`Y[]Yb`_`Ub`b
X`Y`f`@`V`Y`V`Y`bg`f`Ui`a`_`ZØf`G`hY]b`_`Äi`nY`i`b`X`Ub`XYfY`V`Y`X`f`c`\`h`Y`5`fh`Y`b
[Yg]W\Y`f`h`k`Y`f`X`Y`b"8]Y`Y`b[Y`Ni`g`Ua`a`Y`b`U`f`V`Y]h`i`nk]g`W\Y`b
j`Y`fg`W\]Y`X`Y`b`Y`b`5`_`h`Y`i`f`Y`b`]g`h`X`U`V`Y]`X`Y`f`G`W\`Ø`gg`Y`ni`a`_`9`f`Z`c`["

8YhU]g

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