

B Yi Y`Dfc ^Y_hY`]a` < Ui g`XYf
B UW\ U`h][_Y]h. `B Yi !I `a` gYhnh`Ui Z
I a k Y`hgW i hn

8Yf`BYi !I `a Yf`@Y]\`UXYb`]gh`Y]b`9fZc`[/Y]b`bYi Yg`Dfc`Y_h
ghY\h`VYj cfž`k Å\`fYbX`X]Y`Gi W`Y`bUW`Y]bYa`bYi Yb
GhUbXcfh`VY[]bbh"

⇒ a` < YfnYb`j cb`BYi !I `a` \`Uhig]W`]b`XYb`YhnhYb`nk Ò`ZA cbUhYb
XUg`<Ui g`XYf`B UW\ U`h][_Y]h`ni`Y]bYa`YW`hYb`5bn]Y\i b[gdi b_h
Ybhk]W_Y`h`Fi bX`i a`X]Y`H\Ya`Yb`I a k Y`hVYk i gghgY]b`i bX
FYggci fW`bgW`cbi b[\`Uh`XYf`[`Y]W`bUa`][Y`J YfY]b`j]Y`Z`h][Y
5b[YVchY`YhUV`]Yfž`X]Y`]b`XYf`6Yj Ò`_Yfi b[`fc» Yb`5b`_Ub[
Z]bXYb`"6YgcbXYfg`VY`]YVh`g]bX`XUVY`X]Y`b]h]Uh]j Y`FYdU]f(I ž
X]Y`Bi hnYfb`]\`Zž`XYZY`_hY`; Y[YbghÅbXY`ni`fYdUf]YfYbž`gck]Y`X]Y
bYi`Y]b[YZ0`fhY`@Y]\`!6Uf`ž]b`XYf`j YfgW`]YXYbY`A UhYf]U`]Yb`i bX
; YfÅhY`_cghYb`cg`Ui g[Y`Y\Yb`k YfXYb`_ÒbbYb`"8]YgY`5b[YVchY
_ca`a`Yb`]b`NY]hYbž]b`XYbYb`B UW\ U`h][_Y]h`a`Y\`f`XYbb`^Y`ja
: c_i g`ghY\hž`[YbUi`f]W`h]["

I hY`6f]gW`Ufž`J cfghUbXga`]h[`]YX`XYg`J YfY]bgž`Ài » Yfh]g]W
VY[Y]ghYfh`ØVYf`XYb`9fZc`[`XYg`@Y]\`UXYb`!`?cbnYdhg.`8]Y
FYgcbUbn`]gh`ØVYfk`Å`h][YbXž`i bX`k]f`ZYi Yb`i bg`ØVYf`X]Y
nU\`fY]W`Y`I bhYfgh`Øhni b[`Ui g`XYf`; Ya`Y]bXY`"8Ug
_cbh]bi]Yf`]W`Y`K UW`ghi`a`XYf`Bi hnYfnU\`Yb`nY][hž`XUgg`XUg
6Yk i gghgY]b`Z0f`bUW\ U`h][Y`@0gi b[Yb`ghYh][`ni`b]a`a`h`i bX`X]Y
A YbgW`Yb`VYfY]h`g]bXž`bYi Y`K`Y[Y`ni`VYgW`fY]hYbž`i a`]\`fYb
Ò_c`c`[]gW`Yb`i » UVXfi W`_ni`a`]b]a`]YfYb"

5i gVUi d`ÀbY`XYg`J YfY]bg

A]h`XYa`9fZc`[`g]bX`^XcW`Ui W`<YfUi gZcfXYfi b[Yb`j YfVi bXYb"

l a `bcW`a Y`f`5b[YVchY`i bX`Y]bYb`[f0» YfYb`F Ui a `Z0f
5_hj]]h`hYb`ni `gW`UZZYb`z`d`Ubh`XYf`J YfY]b`XYb`5i gVUi `Y]bYg
k Y]hYfYb`GhcW_k Yf_g`ja `Y`Ya U`][Yb`; YV`Ai XY`j cb`Gdcfh`Gc`b`]b
XYf`5i [gVi f[Yf`GhfU» Y" 8 Ug`bYi Y`Dfc`Y`_h`ghY`h`VYfY]hg`]b`XYb
GhUfh`0W`Yfb`i bX`k]fX`XUg`< Ui g`XYf`B UW`U`h][_Y]h`k Y]hYf
VYfY]W`Yfb ž`gc`6f]gW`Uf"

8 Ug`bYi Y`GhcW_k Yf`_gc`F Ui a `Z0f`K cf_g`cdgž`ni g`Ah`n`]W`Y
F`Yd`Uf`Uhi f`Ub[YVchY`i bX`VYgcbXYfY`J Yf`UbghU`hi b[Yb`V]YhYb`z`X]Y
g]W`i a `bUW`U`h][Y`@YVYbgk Y]gYb`XfY`Yb" Ni XYa`g]bX
`bZcfa`Uh]cbgj Yf`UbghU`hi b[Yb`j cf[YgY`Yb`z`X]Y`XUg`K]ggYb`0VYf
0_c`c[]gW`Y`H`Ya Yb`j YfVfY]hYb`i bX`gca`]h`X]Y`c`U`Y
; Ya`Y]bgW`UZh`k Y]hYf`gYbg]V`]g]YfYb`_0bbYb"

8]Y`Gi`W`Y`bUW`bYi`Yb`F`Ai`a`]W`_Y]hYb

8 YbbcW`]gh`XYf`J YfY]b`Ui W`Z0f`X]Y`Ni`_i`bZi`[Yf0ghYh
A]hY`Zf]gh][`k`]fX`Y]b`bYi`Yf`GhUbXc`fh`VYb`0h][hž`XU`X]Y`? UdUn]h`hYb
]a`Yhn][Yb`; YV`Ai XY`VU`X`YffY]W`hgY]b`_0bbhYb" K]f
VYcVUW`hYb`_cbh]bi`]Yf`]W`XYb`A`Uf`_hi`bX`U`hYb`5i`ggW`Ui`bUW
[YY][bYhYb`F`Ai`a`Yb`z`X]Y`i`bgYfYb`6YX0fZb]ggYb`Yb`hgd`fYW`Yb`ž
Z0[hY`6f]gW`Uf`]bni`"

8 Ug`9b[U[Ya`Yb`hž`XUg`XYf`J YfY]b`Z0f`B UW`U`h][_Y]h`i`bX
[Ya`Y]bgW`UZh]W`Y`J Yf`Ubhk`cfhi`b[`nY][hž`U`h`VYfY]hg`j`]Y`Y
l`bhYfgh0hnYf`[Yk`cbbYb`i`bX`nY][hž`k`]Y`k`]W`h][`gc`W`Y``b]h]Uh]j`Yb
]b`i`bgYfYf`Yi`h][Yb`NY]h`g]bX"; YfUXY`]b`Y]bYf`NY]hž`]b`XYf
l`a`k`Y`hZfU[Yb`]a`a`Yf`a`Y`f`]b`XYb`J`cfXYf[fi`bX`f0W`Yb`z`_0bbYb
gc`W`Y`Dfc`Y`_hY`Y]bY`J`cfV`]XZ`b`_h]cb`Y]bbY`a`Yb"

9]b`6`]W`_Ui`Z`XYb`gc`n]U`Yb`9]bZ`i`gg

8]Y`5fVY]h`XYg`J YfY]bg`i`bX`XYfYb`XYYb`g]bX`b]W`h`bi`f`c`U`
fY`Yj`Ub`hž`gc`bXYfb`ghY`Yb`Ui`W`Y]bYb`G`W`f]h`h`]b`ni`Y]bYa
VfY]hYfYb`6Yk`i`gghY]b`Z0f`0_c`c[]gW`Yg`< UbXY`b`XUf" K`A`fYbX`]b
j`]Y`Yb`Gh`X`hYb`A`b`]W`Y`Dfc`Y`_hY`Yb`hghY`Yb`z`[Y`h`Yg`]Yf`i`a`X]Y
G`W`UZZ`b[`Y]bYg`B`Y`h`k`Yf`_gž`XUg`B UW`U`h][_Y]h`]b`XYb`5`hU[
]bhY[f]Yfh`i`bX`gca`]h`Ub[Zf]gh][`J`Yf`AbXYfi`b[Yb`VYk`]f`_Yb`_Ubb"

⊕`Y]bYf`K Y`hž`X]Y`cZij cb`?cbgi a`i bX`K Y[k YfZa YbhU]hÀh
[YdfÀ[h]ghž`V]YhYb`gc`WXY`⊕]h]Uh]j Yb`Y]bY`YfZf]gWXYbXY
5`hYfbUh]j Y`"G]Y`nY][Yb`XYb`A YbgWXYbž`XUgg`Yg`A Ò[`]W_X]hYb
[]Vhž`FYggci fW`b`ni`gdUfYb`i bX`ni gUa a Ybni`_ca a Ybž`i a`U_h]j
@Ògi b[Yb`ZØf`Y]b`VYggYfYg`A cf[Yb`ni`Z]bXYb"

8]Y`9b hk]W_`i b[`XYg`< Ui g`XYf B UW \ U`h][_Y]h

8 Ug`< Ui g`XYf`B UW \ U`h][_Y]h`k i fXY`[Y[fØbXYhž`i a`Y]b
6Yk i gghgY]b`ZØf`Ò_c`c[]gWXY`H\Ya Yb`i bX`Y]bY`bUW \ U`h][Y
@VYbYbgk Y]gY`ni`gW UZYb`"A]h`Y]bYf`J]Y`nU\`j cb`⊕]h]Uh]j Yb`n]Y`h
XYf`J YfY]b`XUfUi Z`UVž`XYb`J YfVfUi W`ni`fYXi n]YfYb`i bX`XUg
Ò_c`c[]gW`j YfUbhk cfh]WXY`< UbXY`b`]b`XYf`; Ya Y]bgW UZh`ni
ZØfXYfb`"BYVYb`XYa`YfZc`[fY]WXYb`Dfc`Y`_h`F YdU]f(I ž`XUg
6Øf[Yf`XUni`Yfa`i h][hž`XYZY`_hY`; Y[Ybgh`AbXY`ni`fYdUf]YfYbž`k]fX
Ui W`X]Y` @Y]\!6Uf`j cb`j]Y`Yb`A YbgWXYb`dcg]h]j`Ub[Ybca`a Yb`
⊕`X]YgYf`@Y]\ghUh]cb`\UVYb`X]Y`6Yk c`bYf`j cb`BYi`! I`a`X]Y
A Ò[`]W_X]hž`K Yf`_nYi [Yž`; Yf`ÀhY`i bX`UbXYfY`bØh`]WXY
; Y[Ybgh`AbXY`Ui gni`Y]\Ybž`ghUh]g]Y`ni`_Ui ZYbž`k Ug`FYggci fW`b
gdUfh`i bX`5VZU`fYXi n]Yfh"

A]h`XYa` [Yd`UbhYb`l a`VUi`Y]bYg`k Y]hYfYb`GhcW_k Yf`_g`k]fX`X]Y
? UdUn]h`Àh`XYg`J YfY]bg`Yf\`Ò\hž`i a`bcW`a`Y`f`5b[YVchY`ZØf`X]Y
6Øf[Yf`VYfY]hni ghY`"Yb`"8]YgY`9b hk]W_`i b[`gd]Y[Y`h`XYb
_cb]h]bi]Yf`]WXYb`6YXUfZ`Ub`bUW \ U`h][Yb`@Ògi b[Yb`k]XYfž`XYf`]b
XYf`\Yi h][Yb`; YgY`gW UZh]a`a Yf`df`ÀgYbhYf`k]fX"

; YgY`gW UZh`]WXY`5i gk]f_`i b[Yb`XYf B UW \ U`h][_Y]hgVYk Y[i b[

8]Y`k UW`gYbXY`5bYf`_Ybbi b[`ZØf`B UW \ U`h][_Y]h`i bX
l a`k Y`hVYk i gghgY]b`]gh`b]W`h`bi`f`Y]bY`c`_U`Yž`gcbXYfb`Ui W`Y]bY
[`cVU`Y`6Yk Y[i b[" `@Ui`h`Y]bYf`l a`ZFU[Y`j cb`GhUh]ghU`Ui g`XYa
>\f`&\$&&[UVYb`+(i`XYf`XYi hgWXYb`6Yj Ò`_Yfi b[`Ubž`XUgg`g]Y
i a`k Y`hVYk i ggh`YVYb`k c`"Yb`"8]Yg`nY][h`Y]b`ni`bY`a`YbXYg
⊕`hYfYggY`Ub`bUW \ U`h][Yb`DfU_h]_Ybž`gck c`\`]b`XYb`Y][YbYb`j]Yf

K ÀbXYb`U`g`Ui W`ja`ÒZZYbh]W`Yb`@YVYb" ` ð`X]YgYa`?cbhYI hgd]Y`h
XUg`<Ui g`XYf`B UW` \U`h][`_Y]h`Y]bY`GW`ØggY`fc`Y`ž]bXYa`Yg`U`g
F Yggci fW`i bX` ðZcfa Uh]cbgnYbhfi a`Zi b[]Yfh"

8 UfØVYf` \]bUi g`k]fX`X]Y`K]W`h][`_Y]h`j cb`gcn]U`Yb` ðhYfU`_h]cbYb
i bX`[Ya`Y]bgW`UZh]W`Yf`Ni gUa`a`YbUfVY]h]a`F U`a`Yb`XYf
B UW` \U`h][`_Y]hgVYk`Y[i b[`]a`a`Yf`XYi`h]W`Yf" ` ð]h]Uh]j`Yb`k`]Y
F YdU]f(I`ZØfXYfb`b]W`h`bi`f`XYb`dfU`_h]gW`Yb`I`a`[Ub[`a`]h
F Yggci fW`bž`gcbXYfb`Ui W`X]Y`gcn]U`Y`J`YfbYhni b[`XYf`6Øf[Yf"
Gc`W`Y`Dfc`Y`_h`gW`UZZYb` ; Ya`Y]bgW`UZh`i`bX`gh`Àf`_Yb`XUg
Ni [Y`Øf][`_Y]hg[YZØ` \`ž`k`Ug`ZØf`Y]bY`bUW` \U`h][`Y`9bhk`]W`i`b[`j`cb
nYbhfU`Yf`6YXYi`hi`b[`]gh"

GhUh]gh]_Yb`i`bX`8 UhYb`ni`f`B UW` \U`h][`_Y]h

5_hi`Y`Y`GhUh]gh]_Yb`VY`Y[Yb`XYb`HfYbX`ni`f`B UW` \U`h][`_Y]h]b
8Yi`hgW`UbX" `8Yf`I`a`k`Y`hVi`bXYgUa`h`6Yf]W`h]j`cb`&`\$`%` \YVh
 \Yf]cfž`XUgg`a`]h`Yfk`Y]Y`a`Y`f`U`g`) \$`i`XYf`XYi`hgW`Yb
<Ui`g`U`h`Y`ni`a`]bXYgh`[`Y`Y[`Ybh]W`G`Y`W`cbX!<UbX!DfcXi`_hY
bi`hnYb" `8]YgY`NU` \`]gh]a`J`Yf[`Y]W`ni`XYb`J`cf`U`f`Yb`ghYh][
[Ygh]Y[Yb`i`bX`nY][`hž`XUgg`]a`a`Yf`a`Y`f`A`YbgW`Yb`VYk`i`gghY
9bhgW`Y]Xi`b[Yb`hfY`ZZYb"

8 UfØVYf` \]bUi g`[]Vh`Yg`Y]bY`ni`bY`a`YbXY`NU` \`j`cb
I`bhYfbY`a`Ybž`X]Y`Ui`Z`bUW` \U`h][`Y`DfU`_h]_Yb`gYhnYb" `@Ui`h`Y]bYf
I`a`ZfU[Y`j`cb`A`W`]bgYm`Ui`g`XYa` ` ð`U`f`&`\$`&` `g]bX`ØVYf` , \$`i`XYf
I`bhYfbY`a`Yb`]b`8Yi`hgW`UbX`XYf`A`Y]bi`b[ž`XUgg`bUW` \U`h][`Y
 ; YgW`À`Z`h`g`a`cXY`Y`U`b[Zf]gh][`d`fc`Z]hUV`Yf`g]bX" `8]Yg`nY][`hž`XUgg
À`W`b`c`a`]ei`Yg`5`bg`À`hnY`]a`a`Yf`a`Y`f`]b`XYb` : c`_i`g`f`ØW`_Yb`ž`k`Ug`ZØf
XUg`<Ui`g`XYf`B UW` \U`h][`_Y]h`i`bX`À` \`b`]W`Y` ð]h]Uh]j`Yb`Y]b
dcg]h]j`Yg`NY]W`Yb`]ghž`i`a` `]`f`Y`5b[YVchY`Ui`gni`VUi`Yb`i`bX`bcW
a`Y`f`A`YbgW`Yb`ni`Y`ffY]W`Yb"

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