

K UggYfUVYbhYi Yf`]a `? fY]g`7U`k .
Gca a Yf`]W\Y`9fZf]gW\i b[Yb`YbhXYW_Yb

9bhXYW_Yb`G]Y`YfZf]gW\YbXY`K UggYf!9f`YVb]ggY`]a `? fY]g
7U`k .`D]W_b]W`Ua `: `i ggž`K UggYfgd]Y`d`ÀhnY`i bX
: `]Y[YbZ]gW\Yb`Z0f`X]Y`[Ubny`: Ua `]Y"

⇒ a `? fY]g`7U`k `gcf[h`XUg`K UggYf`k À\fybX`XYf`Gca a Yfa`cbUhY`Z0f
Ub[YbY`a Y`9fZf]gW\i b[`i bX`j]Y`ZÀ`h][Y`: fY]nY]ha`Ò[`]W_Y]hYb"
CVk`c`_Y]b`A`YYf`]b`XYf`B`À`Y`]ghž`V]YhYb`j`YfgW`]YXYbY`C`fhY`]a
7U`k`Yf`F`Ui`a`Y]bY`k`j`_ca`a`YbY`5V`k`YW`g`i`b[`ni`XYb
_`Ugg]gW\Yb`: fY]VÀXYfb`"CV`?`]bXYfž`: Ua `]Yb`cXYf`K UggYfgd`c`fh`Yf
`X]Y`F`Y[]cb`U`h`Z0f`Y`XYb`Y`hk`Ug`ni`V]YhYb"

9]b`VY`]YVhYg`N]Y`Z0f`X]Y`[Ubny`: Ua `]Y`]gh`XYf`[fc»`Yž`gW`Uhh][Y
K UggYfgd]Y`d`Uhn`Ui`Z`XYf`G`W`k`Y]nYf`K`]YgY`" <]Yf`_`0bbYb`X]Y
?`Y]bYb`i`bhYf`XYb`gdf]hnYbXYb`K UggYfZ`cb`h`À`bYb`gd]Y`Yb`i`bX
Ui`g[Y`UggYb`a`]h`UbXYfYb`?`]bXYfb`[Yb]Y»`Ybž`k`À\fybX`X]Y
9fk`UW`gYbYb`]a`G`W`U`h`Y`b`Y`b`h`gd`U`b`b`Y`b`"8]Yg`]gh`Y]b`]XYU`Yf`C`fhž
i`a`Ub`Y]»`Yb`HU[Yb`XYa`5`hU[`ni`Yb`hZ]Y`Yb"

8 Ug`B`Uhi`fYf`YVb]g`Ua `?`i`fdUf`_`6UX`K`]`XVUX

8Yf`?`i`fdUf`_]b`6UX`K`]`XVUX`d`f`À`g`Y`b`h]Y`f`h`g]W`U`g`C`UgY`XYf
5V`_`0`i`b[`A`]h`gY]bYa`U`h`Y`b`6Ui`a`VY`gh`UbX`i`bX
gW`U`h`Y`b`gd`Y`b`X`Y`b`X`Y`b`D`À`h`n`Y`b`À`X`h`Y`f`ni`a`J`Y`fk`Y]Y`b`Y]b`"8]Y
5V`g`Y`b`_`i`b[`Ua`I`Z`Y`f`X`Y`f`9`b`n`]gh`d`Y`f`Z`Y`_`hž`i`a`X]Y`:`0»`Y`]bg`K`UggYf
ni`hUi`W`Y`b`c`XYf`[`Uf`Y]b`Y`f`Zf]gW\YbXYg`6UX`ni`bY`a`Yb"
5i`»`Y`f`X`Y`a`]gh`X]Y`9`b`n`Ub`j`]Y`Y`b`G`h`Y`Y`b`Ui`»`Y`f`U`V`X`Y`g`DUf`_`g
`Y]W`h`ni`[`À`b`[`]W`i`b`X`[]V`h`5`b`k`c`b`Y`fb`i`b`X`6`Y`gi`W`Y`fb`X]Y
;`Y`Y[Yb`Y]hž`X]Y`B`Uhi`f`ni`[Yb]Y»`Yb`i`b`X`g]W`U`b`Y]»`Yb`HU[Yb`ni
YfZf]gW\Yb"

9]b`k Y]hYfYg`<][\`][\h`Z0f`X]Y`5b[Y`!@YV\UVYf`]gh`6UX`@YVYbnY`ž
VY_Ubbh`Z0f`gY]bY`:`Y[YbZ]gWYfY]"`<]Yf`_0a a Yfh`g]W
:]gWYfY]k Ufh`<Yfa Ubb`FYVa Ubb`i a `X]Y`9f\U`hi b[`XYf`BU[c`X"
6Y]`9]bVfi W`XYf`BUW`h`_0bbYb`6Ygi W`Yf`XUg`Ui »Yf[Yk 0`b`]WY
GW`Ui gd]Y`XYg`<cW`nY]hgZi [g`XYf`9]bhU[gZ]Y[Yb`VYcVUW`hYb"
8]YgY`:`Y[Ybž`X]Y`bi f`(\$`A`]bi hYb`YVYbž`g]bX`Y]b[YZ`bXYbYg
: fYggYb`Z0f`X]Y`j]Y`Yb`: cfY`Yb`]a`:`i`gg":]gWYfY]_i fgY`k YfXYb
YVYbZU`g`Ub[YVchYbž`i bX`Y]bY`6fcgW`0fY`a`]h`bZcfa Uh]cbYb`fi bX
i a`XUg`:`Y[YbZ]gWYb`[]Vh`Yg`]a`?i f\Ui gXUa a "

GW`Uhh][Y`GdUn]Yf[Åb[Y`i bX K`UggYfYf`YVb]ggY

þ`7U`k`!K`]a VYf[`ÅXh`XYf`K`0`ZYgVfi bbYb`ni `Y]bYa
YfZf]gWYbXYb`<U`h`Y]b`"GdUn]Yf[Åb[Yfž`X]Y`XUg`K`]X[Y\Y[Y
i a fibXYbž`VY[Y[bYb`X]YgYa `]ghcf]gWYb`6fi bbYbž`XYf`gW`cb
Zf0`YfY`FY]gYbXY`i bX`K`UbXYfYf`a`]h`Y]bYa`_0`Yb`GW`i`W_
j Yfgcf[hY`8]Y`BUhi f`\]Yf`V]YhYh`b]W`h`bi f`Hf]b_a 0[`]W`_Y]hYbž
gcbXYfb`Ui W`Y]bYb`C`fh`ni a`Gd]Y`Yb`Z0f`X]Y`?]bXYf"

9VYbZU`g`]b`6UX`@YVYbnY`ž`gcf[h`XUg`6ÅW`Y`Z0f`5V_0`i b[`i bX
GdU`"8]YgY`_Y]bYb`K`UggYf`Åi ZY`g]bX`b]W`h`bi f`]b`: fY]Vi f[
VY_Ubbhž`gcbXYfb`Ui W`Ui ZXYf`8f`!A`Yfh`!Dfca`YbUXY`]b`6UX
@YVYbnY`"8Yf`K`UggYf`Ui Z`n]Y\h`?]bXYf`Ubž`X]Y`g]W`[YfbY`XUf]b
YfZf]gWYbž`k`Å`fYbX`X]Y`9`hYfb`Y]bY`DUi`gY`]b`Y]bYa`XYf`bU`Yb
7UZÅg`[Yb]Y»Yb`_0bbYb"

8Yf`Gd]Y`d`Uhn`5i ZXYa`6f0` `]b`7U`k`V]YhYh`Y]b`k`Y]hYfYg
_]bXYfZfYi bX`]W`Yg`9f`YVb]g" <]Yf[]Vh`Yg`Y]b`[fc»Yg
?`YhhYf[Yf0ghž`Y]bY`F`0`fYbfi hgW`Y`i bX`Y]bY`FY]ZYbgW`Ui`_Y`"
6YgcbXYfg`Ub`gca`a`Yf`]W`Yb`HU[Yb`[Yb]Y»Yb`X]Y`?]bXYf`XUg
Gd]Y`Yb`]a`<U[Vfi bbYbVUW`ž`k`Å`fYbX`X]Y`BU[c`X`]b
i ba`]hhY`VUFYf`B`Å`Y`Y]b`UXYbX`ghfU`h"

: 0f`X]Y`↑ b[Yb`BUhi fZfYi bXY`[]Vh`Yg`XYb`6UW`Yf`YVb]gdZUX`]b
=gY`g\Ui`gYbž`XYf`Xi`fW`Y]b`@UbXgW`UZhggW`i`hn[YV]Yh`Z0`fh`5i Z
WfW`+\$\$`A`YhYfb`@Åb[Y`_0bbYb`?]bXYf`i bX`]fY`6Y[`Y]hYf`X]Y
J]Y`ZU`h`XYg`@YVYbg`Ua`6UW`Yb`hXYW`_Yb" `þZc`hUZ`Y`b`]bZcfa`]YfYb

ØVYf`X]Y`j`YfgWk]YXYbYb`H]Yf!`i`bX`DZUbnybUfhYbž`k`cVY]
_]bX[`YfYWkhy`i`fU[`Yb`ni`a`A`]ha`UWkYb`UbFY[`Yb`"

5a`BU[`c`XhU`!F`UXk`Y[`Yf`YVYb`F`UXZU`fYf`X]Y`GWk`Ob`Y]h`XYg
:`i`ggYg`U`i`hbU`"6Y]`GY]hnYbhU`Z]Y»`h`X]Y`BU[`c`X`fi`U`][`i`bX`V]YhYh
]XYU`Y`6YX]b[`i`b[`Yb`ZØf`A`cf[`Yb!`i`bX`BUWk`a`]hU[`ggWk`k`]a`a`Yf`"
8]Y`i`a`[`YVi`b[`]gh`Y]b`UXYbX`ZØf`U`Y`ž`X]Y`g]Wk`]a`K`UggYf`
j`Yf[`bØ[`Yb`cXYf`Y]bZUWk`X]Y`GcbbY`[`Yb]Y»`Yb`k`c`Yb`"

9I`dYfhYb`h]d`d`g`ZØf`K`UggYfZfYi`bXY`

8]Y`Hci`f]ga`i`g`i`a`V<`B`ØfX`]WkYf`GWk`Ufnk`U`X`U`Ä`h`nU`U`fY]WkY
H]ddg`VYfY]hž`k`]Y`6Ygi`WkYf`X]Y`K`UggYfZfYi`XYb`cdh]a`U`bi`hnYb
_ØbbYb`"8Uni`nÄ`Yb`gdUbbYbXY`?`Ubi`hci`fYbž`
GhcWkYf`_U`bZU`fhYb`i`bX`HfYhV`cchZU`fhYb`]b`BU[`c`X`ž`gck`]Y
?`bY]dd!6YW`Yb`]b`GWk`Øa`VYf[`]Gc`k`]fX`XYf`Gca`a`Yf`]a`?`fY]g`7U`k
b]Wk`h`bi`f`Ub[`YbY`a`_Ø`U`ž`gcbXYfb`Ui`Wk`UVk`YWk`g`i`b[`gfY]Wk`"

Bi`hnYb`G]Y`X]Y`J]Y`nU`U`Ub`A`Ø[`]Wk`_Y]hYb`i`bX`[`Yb]Y»`Yb`G]Y`X]Y
Gca`a`YfU`hnY`Ui`Z`Ä`fY`[`Ubny`][`YbY`K`Y]gY`"9bhXYW`Yb`G]Y`X]Y
GWk`Ä`hnY`ž`X]Y`XYf`K`UggYffY]Wk`hi`a`]b`XYf`F`Y[`]cb`ni`V]YhYb`U`hž`
i`bX`Yf`YVYb`G]Y`i`bj`Yf[`Ygg`]WkY`HU[`Y`Ub`XYb`j`]Y`Yb`]Xm`]gWkYb
D`Ä`hnYb`"

9]b`k`YgYb`h]WkYg`A`Yf`_a`U`XYf`F`Y[`]cb`7U`k`]gh`XYfYb`b`UhØf`]WkY
;`Yk`ÄggYfj`]Y`ZU`h`"8]YgY`i`Y[`YVYb`Y]h`U`h`b]Wk`h`bi`f`5i`gk`]f`_i`b[`Yb
Ui`ZX]Y`i`fY]nY]h[`YghU`hi`b[`]ž`gcbXYfb`Ui`Wk`Ui`ZX]Y`i`c`_U`Y
K`]fhgWk`U`Zhi`bX`XYb`Hci`f]ga`i`g`"J]Y`Y`6Ygi`WkYf`fY]gYb`[`Yn]Y`h`Ubž`
i`a`X]Y`BUhi`fgWk`Ob`Y]hYb`XYf`i`Y[`YbX`ni`Yf`YVYb`ž`k`Ug`X]Y
BUWk`ZfU[`Y`bUWk`i`fY]nY]hU`_h]`]hÄ`hYb`i`bX`[`Ughf`cbca`]gWkYb
5b[`YV`chYb`Ub`XYb`i`Yk`ÄggYfb`Ub`_i`fVY`b`_Ubb`"

8]Y`]Xm`]gWkYb`D`Ä`hnY`Ua`K`UggYfž`k`]Y`XYf`K`Ø`ZYgVfi`bbYb`cXYf`
X]Y`6ÄWk`Y`]b`6UX`@YVYbnY`ž`g]bX`b]Wk`h`bi`f`C`fhY`ZØf`
9f`c`i`b[`ggi`WkYbXYž`gcbXYfb`Ui`Wk`5bn]Y`i`b[`gdi`b`_hY`ZØf`
:`Ua`]Yb`i`bX`?`]bXYfž`X]Y`g]Wk`[`YfbY`]a`i`fY]Yb`Ui`Z`U`h`Yb`"8]YgY
HfYbXk`YbXY`U`]b`ni`BUhi`fYf`YVb]ggYb`i`bX`C`i`hX`ccf!5`_h]`]hÄ`hYb`]b
XYf`i`fY]nY]h[`YghU`hi`b[`]gh`Y]b`U`[`Ya`Y]bYf`HfYbX`ž`XYf`]b`j`]Y`Yb`

AbX]WYb`FY[]cbYb`VYcVUW hYh`k]fX"

2 _c`c[]gWY`5gdY_hY`XYf

K UggYf`UbXgW UZhYb

8]Y'; Yk AggYf`ja`?fY]g`7U`k`g]bX`b]W`h`bi`f`9f`c`i`b[gcfhYžg]Y
gd]Y`Yb`Ui`W`Y]bY`VYXYi`hYbXY`F`c`Y`ja`Ò_c`c[]gWYb
;`Y]W[Yk]W`h`XYf`FY[]cb`"GUi`VYfY`i`bX`[i`hYf`U`hYbY'; Yk AggYf
g]bX`@YVYbgfUi`a`ZØf`nU`fY]W`Y`H]Yf!`i`bX`DZUb`nYb`UfhYb`"Gc`]gh
X]Y`BU[c`X`VY]gd]Y`gk`Y]gY`<Y]a`Uh`ZØf`j`YfgW`]YXYbY`;]gW`UfhYbž
k`À`fYbX`X]Y`i`a`]Y[YbXYb`6`ÀW`Y`i`bX`HY]W`Y`@YVYbgfUi`a`ZØf
5a`d`V]Yb`i`bX`ϕgY_hYb`V]YhYb`"

I`a`X]YgYf`6YXYi`hi`b[`[YfYW`h`ni`k`YfXYbž`gYmYb`g]W`c`_U`Y
Cf[Ub]gUh]cbYb`i`bX`:`fY]k`j`][Y`U`_h]j`ZØf`XYb`GW`i`h`i`bX`X]Y
DZY[Y`XYf`; Yk AggYf`Y]b`"<`Ài`Z][`Z]bXYb`FY]b][i`b[gU`_h]cbYb`i`bX
Dfc[fUa`a`Y`ni`f`5i`Z`_`Àfi`b[`ØVYf`X]Y`6YXYi`hi`b[`gUi`VYfYf
; Yk AggYf`ghUhh`Gc`W`Y`ϕ]h]Uh]j`Yb`hfU[Yb`b]W`h`bi`f`ni`f`9f`U`hi`b[
XYf`BU`hi`f`VY]ž`gcbXYfb`gYbg]V]`g]YfYb`Ui`W`X]Y`6Ygi`W`Yf`ZØf
Ò_c`c[]gWY`:`fU[YghY`i`b[Yb`"

: fY]nY]hU_h]j]hÀhYb`i`bX`K UggYfgdcfh

8 Ug`5b[YVch`Ub`:`fY]nY]hU_h]j]hÀhYb`fi`bX`i`a`X]Y'; Yk AggYf`]b
7U`k`i`]gh]j]Y`Z`À`h]["B`YVYb`:`Y]Y`b`Z]gW`Yb`]b`6UX`@YVYbnY`][]Vh`Yg
nU`fY]W`Y`A`Ò[`]W`_Y]hYb`ZØf`?`Ubi`!`i`bX`?`U`U`_h`ci`fYb`"8 Ug`9f`YVYb
XYf`BU`hi`f`j`ca`K`UggYf`Ui`g`YfZfYi`h`g]W`[`fc`»`Yf`6Y`]YVh`Y]hi`bX
V]YhYhY]bY`gd`UbbYbXY`DYfgdY_h]j`Y`Ui`Z`X]Y`k`i`bXYfgW`ØbY
@JbXgW`UZh`"

8]Y`BU[c`X`ž`X]Y`g]W`X`i`fW`X]Y`FY[]cb`gW`Àb[Y`hž`]gh`XUVY]
VYgcbXYfg`UhhfU_h]j`ZØf`K`UggYfgdcfh`Yf`"8]Y`fi`][Yb`5VgW`b]hhY
V]YhYb`]XYU`Y`6YX]b[i`b[Yb`ZØf`5b`Z`Àb[Yfž`k`À`fYbX`YfZU`fYbY
DUXX`Yf`Y`fUi`gZc`fXYfbXY`Ghfca`gW`bY`Yb`Z]bXYb`_`Øb`bYb`"Gh`Ub`X!
I`d!`DUXX`]b[`U`h`YVYb`ZU`g`Ub`D`cdi`Uf]h`À`h`[Yk`cbbYbž`i`bX
nU`fY]W`Y`5bV]YhYf`j`Yfa`]YhYb`9ei`]da`Ybh`ZØf`Bi`h`nYfž`X]Y`XYb
HfYbX`Ui`gd`fcV]YfYb`a`ÒW`hYb`"

6YgcbXYfY`J YfUbghU`hi b[Yb`i bX` : Ygh]j U`g

⇒ @Ui ZY`XYg`Gca a Yfg`Z]bXYb`Ybh`Ub[`XYf`; Yk ÅggYf`]b`XYf
FY[]cb`j YfgWΛ]YXYbY`J YfUbghU`hi b[Yb`ghUhhz`X]Y`X]Y`5hhfU`h]j]hÅh
XYf`K UggYf`UbXgWΛ UZhYb`i bhYfghfY]WΛYb``: Ygh]j U`g`i bX`A Åf`hYž
X]Y`cZh`]b`J YfV]bXi b[`a`]hY]bYa`VYgcbXYfYb`K UggYfYj Ybh
ghY`Ybž`n]Y`Yb`nU`fY]WΛY`6Ygi WΛYf`Ub``8]YgY`9j Ybhg`V]YhYb
b]WΛh`bi f`i bhYf`U`hi b[ž`gcbXYfb`Ui WΛ`X]Y`A Ò[`]WΛ`_Y]hž`X]Y`c`_U`Y
?i`hi f`i bX`; Ughfcbca]Y`_YbbYbni`YfbYb"

9]b`6Y]gd]Y`ZØf`gc`WΛ`Y]bY`J YfUbghU`hi b[`_ÒbbhY`Y]b`Gca a YfZYgh
Ub`XYf`BU[c`X`gY]bž`VY]`XYa`K cf`_g`cdg`ZØf`?]bXYfž
A i g]_Ui ZØ`fi b[Yb`i bX`_i`_]bUf]gWΛY`GhÅbXY`ZØf`Y]b
UVk YWΛg`i b[gfY]WΛYg`Dfc[fUa`a`gcf[Yb``Gc`WΛY`; Y`Y[Yb`Y]hYb
ZØfXYfb`XUg`; Ya`Y]bgWΛ UZhg[YZØ`i`i bX`n]Y`Yb`gck`c`\`
9]b`Y]a`]gWΛY`U`g`Ui WΛ`Hci f]ghYb`Ub"

: Øf`U`_hi Y`Y`⇒Zcfa Uh]cbYb`ØVYf`J YfUbghU`hi b[Yb`i bX`
: fY]nY]hUb[YVchY`Ya`dZ]Y`h`g]WΛ`Y]b`6`]W`_Ui ZX]Y`K YVgY]hY`XYf
Hci f]ga`i`g`; a V<`B`ÒfX`]WΛYf`GWΛk Ufnk U`Xž`X]Y`fY[Y`a`Å»][
9]b`V`]W`_Y`]b`UbghY`YbXY`9j Ybhg`i bX`<][`\\][`hg`]b`XYf`FY[]cb
V]YhYh`f`Hci f]ga`i`g`; a V<`B`ÒfX`]WΛYf`GWΛk Ufnk U`Xž`"

8YhU]`g

6Ygi WΛYb`G]Y`i bg`Ui Z.`b!U["XY