

9N6!DUd]Yf'a Uf_]Yfh'9fZc`[gZU_hcfYb`ZØf
7687gž'8][]hU`'9i fci`':]bUbW

ϕ`Y]bYa`ijcb`XYf'9i fcdÀ]gWYb`NYbhfU`VUb_`f9N6Ł
j YfØZZYbh]W`hYb`DUd]Yf`k YfXYb`j YfgW]YXYbY`6YX]b[i b[Yb
ZØf`X]Y`YfZc`[fY]WY`9]bZØ\fi b[`X][]hU`Yf
NYbhfU`VUb_k À\fi b[Yb`f7687gŁ`k]Y`XYa`Y][YbYb`X][]hU`Yb
9i fci`XYf'9i fcncbY`X]g_i h]Yfh"8]Y`5i hcfYb`k Y]gYb`Ui W`Ui Z
j YfgW]YXYbY`F]g]_Yb`\]bž`X]Y`gc`WY`Dfc`Y`_hY`a`]h]g]W
Vf]b[Ybž`k]Y`X]Y`; YZU\f`XYf`J YfXfÅb[i b[`XYg`Df]j UhgY`_hcf`g"
9N6.`8][]hU`Yf'9i fci`gc`hY`k Y]h] YfvfY]hYh`ZØf`NU\`i b[Yb
j Yfk`YbXYh`k YfXYbž`b]W`h`ZØf`ϕ] Ygh]h]cbYb`l`a`Y]b
YfZc`[fY]WY`g`7687ž`a`i gg`Y]bY`K À\fi b[gVY\ØfXY`X]Y
X][]hU`Y`K À\fi b[`U`g`k Y]h] YfvfY]hYh`g`NU\`i b[g!`i`bX
HUi gW`a`]hY`a`]h`Ui gfY]WYbXYf
K YfhUi ZVYk U\fi b[gZ`b_h]cb`YhUV`YfYbž`gc`XUg`DUd]Yf`XYf
9i fcdÀ]gWYb`NYbhfU`VUb_";`Y]W`nY]h][`a`ØggYb`X]Y
NYbhfU`VUb_Yb`g]WYfghY`Ybž`XUgg`K À\fi b[Yb`k]Y`X]Y
X][]hU`Yf'9i fci`b]W`h`ini`/`Ua`d`^Y`d/

⇒b`Y]bYa` j cb`XYf`9i fcdÄ]gWXYb`NYbhfU`VUb`_`f9N6Ł
j YfÖZZYbh]W hYb`DUd]Yf`k YfXYb`j YfgW]YXYbY
6YX]b[i b[Yb`ZØf`X]Y`YfZc`[fY]WXY`9]bZØ\fi b[`X][]hU`Yf
NYbhfU`VUb`_k Ä\fi b[Yb`f7687gŁ`k]Y`XYa`Y][YbYb
X][]hU`Yb`9i fc`XYf`9i fcnCbY`X]g_i h]Yfh"8]Y`5i hcfYb
k Y]gYb`Ui W`Ui Z]j YfgW]YXYbY`F]g]_Yb` \]bž`X]Y`gc`WY
Dfc`Y`_hY`a`]h`g]W`Vf]b[Ybž`k]Y`X]Y` ; YZU`f`XYf
J YfXfÄb[i b[`XYg`Df]j UhgY`_hcfg"

9N6.`8][]hU`Yf`9i fc`gc``hY`k Y]h`j YfVfY]hYh`ZØf
NU\`i b[Yb`j Yfk YbXYh`k YfXYbž`b]W h`ZØf
⇒bj Ygh]h]cbYb

I a`Y]b`YfZc`[fY]WXYg`7687ž`a` i gg`Y]bY`K Ä\fi b[gVY\ÖfXY`X]Y
X][]hU`Y`K Ä\fi b[`U`g`k Y]h`j YfVfY]hYhYg`NU\`i b[g!`i bX
HUi gW`a`]hY`a`]h`Ui gfY]WXYbXYf`K YfHUi ZVYk U\fi b[gZ`b`_h]cb
YhUV`]YfYbž`gc`XUg`DUd]Yf`XYf`9i fcdÄ]gWXYb`NYbhfU`VUb`_`
;`Y]W`nY]h][`a` ØggYb`X]Y`NYbhfU`VUb`_Yb`g]WXYfghY`Y`bž`XUgg
K Ä\fi b[Yb`k]Y`X]Y`X][]hU`Yf`9i fc`b]W`hni`Y]bYa`VYXYi hYbXYb
⇒bj Ygh]h]cbga`]hY`k YfXYbž`df]j UhY`NU\`i b[g`Øgi b[Yb`j YfXfÄb[Yb
cXYf`X]Y`A`]h`Yffc``Y`XYg`6Ub`_YbgY`_hcfg`i bhYf[fUVYb"

8 Ug`8c`_i a`Ybž`XUg`X]YgY`K`cWXY`j YfÖZZYbh]W`h`k`i`fXYž`k`i`fXY
j`cb`XfY]`c`W`fUb[] [Yb`9N6!6YUa`hYb`j YfZUggh` :`UV]c`DUbYhUž
I`f]W`6]bXgY]`i`bX`≠`bUW]c`HYfc`"G]Y`]ghYb`X]Y`k`]W`h][`ghYb
9fZc`[gZU`_hcfYb`ZØf`7687g`Ui Zi bX`[YVYb`]fY
9i dYfhYba`Y]bi b[Yb`UVž`k]Y`F]g]_Yb`]a`Ni gUa`a`Yb`Ub[`a`]h`XYb
X][]hU`Yb`J Yfg]cbYb`j`cb` :`]Uh`K Ä\fi b[Yb`j Yfa`]YXYb`k YfXYb
_ÖbbYbž`X]Y`8i hYbXY`j`cb`@ÄbXYfb`Ui ZXYf`[UbNyb`K`Y`hž
Y]bgW`Y]Y`W`[fc`Yf`J`c`_gk`]fhgW`UZhYbž`XYfnY]h`i`bhYfgi`WXYb
cXYf`Yb`hk`]W`Y`b"

8 Ug`DUd]Yf`]XYbh]Z]n]Yfh`XfY]`6YX]b[i b[Yb`ZØf`X]Y`YfZc`[fY]WXY
I a`gYhni b[`Y]bYg`7687"8]Y`YfghY`]gh`X]Y` <ÄbX`YfU`_nYdhUbn`ž
X]Y`VfY]h`gY]b`a` i ggž`k Ug`VYXYi hYhž`XUg`X]Y`6Ybi hYf`ØVYfU`

X][]hU`VYnU\`Yb`_ÖbbYb`gc`hYb" `a `; Y[YbgUhn`ni `DUd]Yf[Y`X
ZU`Yb`VY]`Y]bYf`X][]hU`Yb`K `À\fi b[`k U\fgWXY]b`]W` ; YVØ\fyb`ZØf
`YXY`HfUbgU_h]cb`Ub`i bX`Yg`g]bX`XYX]n]YfhY` ; YfÅhY`ni f
J YfUfVY]hi b[`XYf`NU\`i b[Yb`YfZcfXYf`]W`" `9g`[]Vh`Ui W`UbXYfY
l bhYfgW]YXYž`cVkc`V`VY]XY` ; Y`XZcfa Yb`XYb`GhUhi`g`Y]bYg
[YgYhn`]WXYb`NU\`i b[ga]hY`g`UUVYb" `8]Y`9N6`ZØ\fh`Ui g.

6Uf[Y`X`]gh`]a `9!7ca a YfW`i bdfU_h]gW`ž`k `À\fyb`X`X]Y
9]bZØ\fi b[`j`cb`7687`U`g`[YgYhn`]WXYg`NU\`i b[ga]hY`
5i gbU`a Yb`ZØf`<`ÀbX`Yf`YfZcfXYfb`_Ubbž`X]Y`b]W`h`ØVYf
XUg`YfZcfXYf`]WXY` ; YfÅh`j`YfZØ[Ybž`i a `VUf[Y`X`cgY
NU\`i b[Yb`ni `U_nYdh]YfYb"

8Yf`nk Y]hY`9fZc`[gZU_hcf`k i fXY`U`g` YZZ]n]YbhY`J YfhY`]i b[
XYZ]b]Yfh" `8]Y`9N6!6YUa`hYb`n]h]YfYb`U`9i f`c`g`m`g`h`Y`a `6Yf]W`hž
k cbUW`Y]b`X][]hU`Yf`9i f`c`j`cb`VYUi`Zg]W`h][hYb``hYfa`YX]ÅfYb`k`JY
6Ub`_Yb`i bX`fY[i `]YfhYb`NU\`i b[gUbV]YhYfb`j`Yfhf]YVYb`k`YfXYb
gc`" `I a `XYb`J Yfhf]YV`XYf`X][]hU`Yb`NYbhfU`VUb`_k `À\fi b[`ni
ZØfXYfbž`_ÖbbYb`VYUi`Zg]W`h][hYb``hYfa`YX]ÅfYb`5bfY]nY`[YnU\`h
k YfXYb" `8Ug`8c`_i a Ybhi`bhYfhY`]h`J`Yfa`]h`i b[gX]YbghY`]b`nk`Y]
?UhY[cf]Yb.`CbVcUfX]b[`!`i bX`:`]bUbn]Yfi b[gX]YbghY`
Y]bgW`Y]Y`»]W`XYf`CdYfUh]cbYbž`X]Y`ni f`9fØZZbi b[ž`J`Yfk`U`hi b[
i bX`GW`Y]Y`»i b[`Y]bYg`7687!`?cbhc`g`YfZcfXYf`]W`g]bX` `i bX
NU\`i b[gX]YbghY"

...

B UW`ZfU[Y`j`cb`J YfVfUi`WXYfb` `]gh`X]Y`Xf]hY`9fZc`[gVYX]b[i b[ž
X]Y`g]W`Ui`ZX]Y` : `À\][_Y]h`VYn]Y\`hž`XYb`7687`ni`bi`hnYbž`i a
ØVYfU`ž`g]WXYf`i bX`df]j`Uh`ni`VYnU\`Yb`ž`VYhc`bh`XUg`DUd]Yf" `9N6!
8]fY_hcf]i a ga]h[`]YX` : UV]c`DUbYhhU`i bX`gY]bY`?c`Y[Yb`[`Ui`VYbž
XUgg`9]bk`c`bYf`XYg`9i fcfUi`a`g`Xi`fW`X]Y`Cd]h]cb`a`ch]j`]Yfh
k YfXYb`_ÖbbYbž`XYb`X][]hU`Yb`9i f`c`ZØf`DYfYf!hc!DYfYf
fD&DŁ!NU\`i b[Yb`Ui`»Yf`U`V`XYf`F`Y]W`k`Y]hY`VYghY`YbXYf`df]j`UhYf
@Øgi b[Yb`ni`j`Yfk`YbXYb" `8UhYbgW`i`hn`_Ubb`Y]b`k`Y]hYfYf

A ch]j Uh]cbgZU_hcf'gY]bž'gU[Yb'g]Y'i bX'k Y]gYb'XUfUi Z'\]bž'XUgg
NYbhfU'VUb_Yb'HYWb]_Yb'ni f'J YfVYggYfi b['XYf'Df]j Uhg d\ÄfY
Ubk YbXYb'_ÖbbhYbž'k Ä\fybX'g]Y'k Y]hYf\]b'X]Y'J c fgWf]ZhYb'ni f
6Y_Äa dZi b['XYf'; Y'Xk ÄgWY'Y]b\U'hYb"'Hfchn'DfchYghYb'[Y[Yb
XYb'X][]hU'Yb'9i fc'[YfUXY']b'X]YgYf'<]bg]W'h'VYghY\Yb'X]Y'XfY]
9I dYfhYb'XUfUi Z

5'g'ÖZYbh]WY'i bX'i bUV\Äb[][Y' ðgh]hi h]cbYb'\UVYb
NYbhfU'VUb_Yb'_Y]b' ðhYfYggY'XUfUbž'X]Y'NU\`i b[gXUHb
XYf'Bi hnYf'ni 'a cbYhUf]g]YfYb"'G]Y'k ØfXYb'X]YgY'8UHb
bi f']b'XYa' l a ZUb['j YfUfVY]hYbž'XYf'ZØf'X]Y
K U\fbY\`a i b[']\fyf'5i Z[UVYb'YfZcfXYf'W]]gh'i bX']b
j c`Yf', VYfY]bgh]a a i b['a]h'XYb'N]Y'Yb'XYg'ÖZYbh]WYb
ðhYfYggYg'i bX'XYb'FYW'hgj c fgWf]ZhYb"

DUd]Yf'gW`Ä[h'A U» bU\`a Yb'ni f'J Yfa Y]Xi b[
j cb'7687!F]g]_Yb'j cf

8 Ug'9N6!DUd]Yf'YfØfhYfh'Ui W`Y]b][Y'XYf'F]g]_Ybž'X]Y'a]h
X][]hU'Yb'NYbhfU'VUb_k Ä\fi b[Yb'j YfVi bXYb'g]bXž'k]Y
VY]gd]Y`gk Y]gY'ØVYfa Ä»][Y'7687!6YghÄbXY"'8Uf]b'k YfXYb'Y]bY
FY]\Y'j cb'A U» bU\`a Yb'j cf[YgW`U[Ybž'i a 'Y]bYb'XUi Yf\UZhYb
cXYf'j cfØVYf[Y\YbXYb'ØVYfa Ä»][Yb'; Y'XZi gg']b'Y]bY'X][]hU'Y
NYbhfU'VUb_k Ä\fi b['ni 'j Yf\]bXYfbž'Y]bgW`Y]Y»`]W`XYf
9]bZØ\fi b['Y]bYf'Y]b[YgW`fÄb_hYb'?cbj Yfh]V']hÄhž'X]Y'XYb
dchYbn]Y`Yb'5VZi gg'j cb'6Ub_Y]b`U[Yb']b'Y]bY'7687`VYYbXYb
_ÖbbhY"'5'g'k Y]hYfYg'<]bXYfb]g'_ÖbbhY'X]Y': YghgYhni b['j cb'Dfc!
?cdZ; fYbnYb'a]h'Y]bYf'C VYf[fYbnY'ZØf'X]Y'A Yb[Y'Ub'7687
X]YbYbž'X]Y'YXYf'9]bnY`bY'VYg]hnYb'XUfZ'

8 Ug'8c_i a Ybh'VYZUggh'g]W`a]h'6YXYb_Ybž'XUgg'X]Y'5i gghY`i b[
Y]bYg'7687`Y]bYb'DfcnYgg'XYf'8]g]bhYfa YX]Uh]cb'j cb'6Ub_Yb
Ui g`ÖgYb'i bX'NU\`i b[g`Ögi b[Ybž'X]Y'XYfnY]h'j ca' Df]j UhgY_hcf
Ub[YVchYb'k YfXYbž'j YfXfÄb[Yb'_ÖbbhY"'l a'X]YgYb'bY[Uh]j Yb
9ZY_h'ni 'j Yfa Y]XYbž']gh'Yg'YbhgW`Y]XYbXž'Y]bYb'Ui gfY]W`YbXYb

: i b_h]cbgi a ZUb['ni 'Z]bXYb"G]Y'gc`hY'k YXYf'ni 'k Y]h[YZUggh
gY]bž'i a '@Øgi b[Yb'XYg'df]j UhYb'GY_hc'fg'ni 'j YfXfÅb[Ybž'bcW'ni
Yb['Y ZUggh'gY]bž'i a 'XYb'9]bgUhn'XYf'X][]hU'Yb
NYbhfU`VUb_k Å\fi b['Y]bni gW fÅb_Yb"'8]Yg_`ÖbbhY'Y]bY
<YfUi gZcfXYfi b['ZØf'XYb':]bUbngY_hcf'XUfghY`Ybž'k UfbYb'X]Y
9N6!J YfhfYhYf"

8]Y'5i hcYb'XYg'DUd]Yfg'_ca a Yb'ni 'XYa 'GW'`i ggž'XUgg'7687g
nk Uf'_UfY'J cfnØ[Y'\UVYb'i bX'NYbhfU`VUb_Yb'HfYbXg']a
NU\`i b[gj Yf_Y\fi bX'j]b'XYf'HYW'bc`c[]Y'Zc`[Yb'a ØggYbž'i a
k Y]hYf\]b']\fY'5i Z[UVY'ni 'YfZØ`Ybž'gck c\`6Øf[Yfb'U`g'Ui W
l bhYfbY\`a Yb'ni 'X]YbYbž'UVYf'bcW'j]Y'Y': fU[Yb'ni f'; YghU`hi b[
j cb'U'K Å\fi b['k]Y'XYf'X][]hU'Y'9i fc"'BYVYb'XYa
: i b_h]cbgi a ZUb['gY]Yb'Y]b[YY][bYhYg; YgW'ÅZha cXY`'i bX
YbhgdYfW'YbXY'?cbhfc`Yb'YfZcfXYf`]W'ž'i a 'XYb'5bZcfXYfi b[Yb
[YfYW'h'ni 'k YfXYb'i bX'Y]bY'fcVi ghY'Bi hni b['XYg'7687'ni
[Yk Å\f`Y]ghYbž'VYhcbYb'g]Y"

; `Ui VYb'G]Yž'XUgg'X]Y'9i fcdÅ]gW'Y'NYbhfU`VUb_'Y]bYb
YfZc`[fY]W'Yb'X][]hU'Yb'9i fc`\YfUi g[YVYb'k]fX3'HY]'Yb
G]Y'≠fY'; YXUb_Yb'ni 'X]YgYa 'H\Ya U]b'XYb'?ca a YbhUfYb
i bhYb'a]h"

6]'XbUW'k Y]gY. 'G\i hhYfghcW_ž'D]l UVUmž'K]_]`7ca a cbg

K Y]hYfY'VY`]YVhY'B UW'f]W'hYb

: U`g'8i 'Yg'j YfdUggh'\Ugh

fØ bWh]cbfXž'gž']XŁ'o'j Uf'`gž'Z'g'1 'X"[Yh9`Ya Ybhg6mHU[BUa YfgŁQ\$Q'
]ZfK"[Yh9`Ya Ybh6mXf]XŁŁ'fYhi fb/'`g'1 'X"WfYUhY9`Ya YbhfgŁ/'`g"]X'1
]X/'`g"gfW' "hhdg. #WcbbYWh"ZUW'Vcc_"bYh#YbSl G#gX_"`g. l ZVa `1 %/
j Yfg]cb1 j ' "&"/Z'g"dUfYbhBcXY"]bgYfh6YZcfYf'gž'Z'gŁ'/qfXcW a Ybž
fgWf]dhfž'fZUW'Vcc_!'`ggX_fŁŁ/

8YhU]`g

6Ygi W\Yb`G]Y`i bg`Ui Z.`_fmdhc!bYk g"Uh