J Yfa]gghY '7\]UfU'7"']b 'B]YZYfb!
2 gWXY`Vfcb b '[Ygi bX'ni fØW_[Y_Y\fh

7\]UfU'7"ž'X]Y'gY]h'XYa '%%"\$, "&\$&('j Yfa]ggh'k i fXYž']gh
k c\`VY\U'hYb'Ui Z[ YZi bXYb"Dc`nY]'VYXUb_h'g]W'ZØf'X]Y
A]h\]ZY"

⇒ a '9bn_fY]gž'[YbUi Yf'[YgU[h']b 'B]YZYfb!2 gWXY`Vfcb bž'[ UV`Yg
_Øfn']W'Y]bYb'YfZfYi`W'Yb'B UW'hfU['ni f'J Yfa]gghYbZU\ bXi b["
8]Y'gY]h'XYa '%%"5i [i gh&\$&('j Yfa]gghY'% !Å\ f][Y'7\]UfU'7"
k i fXY'k c\`VY\U'hYb'[ YZi bXYb"B UW'XYa 'X]Y'Dc`nY]'i a
l bhYfghØhni b['VY]'XYf'Gi W'Y'[YVYhYb'\UhhYž'k i fXY'X]Y'B UW'f]W'h
bi bž'XUb_'XYf'[fc» Yb'ÖZZYbh]W'Yb'5i Za Yf_gUa _Y]hž'dcg]h]j
VYYbXYh"

8]Y': U\ bXi b['b UW'7\]UfU'\UhhY']b'XYb''YhnhYb'HU[Yb'j]Y`Y
A YbgW'Yb'VYk Y[h"NU\`fY]W'Y'A YX]Yb'\UhhYb'X]Y': chcg'i bX
⇒ Zcfa Uh]cbYb'ØVYf'X]Y'J Yfa]gghY'j YfÖZZYbh]W'hž'i a 'X]Y'Gi W'Y
ni 'i bhYfghØhnyb"B i bž'XU'X]Y'F ØW__Y\ f'XYg'A ÅXW'Ybg'[Yg]W'Yfh
]ghž'_ca a h'Y]b'k]W'h][Yf'5ddY''j cb'XYf'Dc`nY]. '5''Yž'X]Y'X]Y
6]XYf'i bX'6Yf]W'hY'[YhY]'h'\UVYbž'gc''Yb'X]YgY'V]hhYb''ÖgW'Yb"
8Ua]h'gc''X]Y'Df]j Uhgd\ÅfY'j cb'7\]UfU'[YgW'Øhnh'k YfXYbž'k Ug]b
gc`W'Yb': Å''Yb'j cb'[fc» Yf'6YXYi hi b[']gh"

2 ZZYb h`]W'Y' i bhYfghØhni b [

8]Y' i bhYfghØhni b['XYf'2 ZZYbh]W'_Y]h'gd]Y'hY]bY'YbhgW'Y]XYbXY
F c''Y'VY]'XYf'Gi W'Y'b UW'j Yfa]gghYb'DYfgcbYb''⇒ 7\]UfU'g': U`
\UVYb'NYi [Yb'i bX'ZfY]k]''[Y'<Y'ZYf'\fY'5i [Yb'c ZZYb [Y\U'hYb
i bX'VY]'XYf'K U\fbY\ a i b['dchYbn]Y''Yf'<]bk Y]gY'a]h[Yk]f_h"
8Ug'nY][hž'k]Y'j Yf_bØdZhi bgYfY'; YgY''gW'UZh]gh'i bX'k]Y'gW'bY''
j]Y'Y'A YbgW'Yb'ni gUa a Yb_ca a Yb'_ÖbbYbž'i a '<]ZY'ni ''Y]ghYb"

8]YgY'5fhj cb'Ni gUa a YbUfVY]h'gh'cZha U'g'XYf'GW'ØggY''ni a
9fZc`['j]b'JYfa]gghYbZÀ''Yb"

⊕'XYf'FY[Y'ž'k Ybb'Y]bY'DYfgcb'U'g'j Yfa]ggh['hž'k]fX'b]W'h'bi f
X]Y'Dc`]nY]'U_h]j ž'gcbXYfb'Yg'gW'U'hY'h'g]W'cZn'Ui W'X]Y'[YgUa hY
; Ya Y]bgW'UZh'Y]b''': fYi bX]bbYbž': fYi bXYž'B'UW'VUfb'i bX'gc[Uf
: fYa XY]'b'gcn]U'Yb'A YX]Yb'g]bX'XUbb'ja a Yf'VYfY]hž'ni
i bhYfghØhnYb''8]Yg'nY][hž'XUgg'Y]b'gh'Åf_YfYg'; Ya Y]bgW'UZh'g[YZØ\`
YbhghY\hž'k Ybb'a Ub'g]Y\hž'XUgg'Ya UbX'j]b'; YZU\f'cXYf'j]b'Y]bYf
_f]h]gW'Yb'G]hi Uh]cb'j]gh"

8]Y'6YXYi hi b['XYf'gW' bY''Yb'A Y'Xi b[

8]Y'Dc`]nY]'U'h]b'j]\fYf'A]hY]i b['Ui W'XUfUi Z'\]b[Yk]YgYbž'k]Y
k]W'h]['Yg']ghž'ZY\`YbXY'DYfgcbYb'gc'ZfØ\`k]Y'a Ø['j]W'ni 'a Y'XYb"
⊕'7\]UfU'g': U''k i fXY'XUg'A ÅXW'Yb'Ua '%%''5i [i gh'U'g'j Yfa]ggh
[Ya Y'XYhž'i bX'X]Y'A U»bU\`a Yb'ni f': U\`bXi b['k i fXYb'i a [Y\`YbX
Y]b[Y'Y]hYh''9]bY'gW' bY''Y'F YU_h]cb'_Ubb'cZn'YbhgW'Y]XYbX'gY]bž
i a 'Y]bY'YfZfYi 'j]W'Y'@Øgi b['ni 'YffY]W'Yb"

8]Y'5i Zc'fXYfi b['ni f'@ØgW'i b['XYf'6]XYf']gh'Ui W'Y]b'k]W'h][Yg
@VYbgnY]W'Yb'i bX'nY][h'F YgdY_h'ZØf'X]Y'Df]j Uhgd\`ÅfY'XYf
6YhfcZYbYb''⊕'Y]bYf'NY]hž']b'XYf'⊕Zc'fa Uh]cbYb'V`]hngW' bY''
j YfVfY]hY'h'k YfXYbž']gh'Yg'k]W'h][ž'XYb'gYbg]V'Yb'l a [Ub['a]h
XYfUfh][Yb'8UhYb'ni 'VYfØW_g]W'h][Yb''5i W'X]Y'Dc`]nY]'XUb_h
U''Ybž'X]Y'VY]XYf'Gi W'Y'bUW'7\]UfU'a]h[Yk]f_h'\UVYbž'i bX
Yf_Ybbh'X]Y'6YXYi hi b['ØZYbh]W'Yb'9b[U[Ya Ybhg'Ub"

⊕g[YgUa h'gh'X]Y'F ØW__Y\`f'j cb'7\]UfU'7''Y]bY'Yfa i h][YbXY
9bhk]W'_i b['i bX''Åggh'i bg'U''Y'Ui ZUha Yb''Gc`W'Y'J cfZÀ''Y
Yf]bbYfb'i bg'XUfUbž'XUgg'Yg']b'i bgYfYf'; Ya Y]bgW'UZh']a a Yf
bcW'j]Y'Y'[]Vhž'X]Y'VYfY]h'g]bXž'ni ni \ØfYb'i bX'ni 'i bhYfghØhnYb"
8]Y'gW' bY''Y'5i ZØgi b['X]YgYf'J Yfa]gghYbZU\`bXi b['nY][hž'XUgg
Ni gUa a YbUfVY]h'i bX'5i Za Yf_gUa _Y]h'XYf'GW'ØggY''g]bXž'i a
j Yfa]gghYb'DYfgcbYb'ni '\Y'ZYbž'fYW'hY]h]['[YZ] bXYb'ni 'k YfXYb"

K]W'h][_Y]h'XYf'Df]j Uhgd\`ÅfY

8]Y`G]hi Uh]cb`i a `7\]UfU`]gh`Ui W\`Y]bY`A U\bi b[ `ni f
6YfØW_g]W\h][i b[`XYf`Df]j Uhg\`ÄfY`XYf`6Yhfc ZYbYb" ` ð`Y]bYf`NY]hž
]b`XYf`gcn]U`Y`A YX]Yb`i bX`ÖZYbh`]W\Y`D`UhhZcfa Yb`k Y]h]j YfVfY]hYh
g]bXž`]gh`XYf`fYgdY`_hj c`Y`i a [Ub[`a ]h` ðZcfa Uh]cbYb`j cb`[fØ» hYf
K]W\h][`\_Y]h" `9g`V`Y]Vh`ni `c ZYbž`XUgg`X]Y`GYbg]V`]hÄh`]b`XYf
6Yf]W\hYfghUhi b[`ØVYf`gc`W\Y` : Ä`Y`ni b]a a hž`i a `X]Y`VYhfc ZYbYb
DYfgcbYb`ni `gW\ØhnYb"

<]b hYf[fi bX`XYf`J Yfa]gghYb ZÄ`Y`]b 8 Yi hgW\`UbX

ð`8Yi hgW\`UbX`]gh`Yg]a a Yf`k ]YXYf`ni `J Yfa ]gghYb ZÄ`Yb`ni
VYcVUW\hYbž`X]Y` : Ua]]Ybž` : fYi bXY`i bX`X]Y` [YgUa hY
; Ya Y]bgW\UZh`ghUf`_VY`UghYb" `8]Y` ; fØbXYž`k Ufi a `A YbgW\Ybž
]bgVYgcbXYfY` ð [ Yb`X`]W\Y`ž`j YfgW\k ]bXYbž`g]bX`j ]Y`ZÄ`h][ `i bX
_ÖbbYb`j cb`ZUa]]ÄfYb`DfcV`Ya Yb`V]g`\]b`ni `dgmW\]gW\Yb
6Y`Ughi b[ Yb`fY]W\Yb" `GhUh]gh]\_Yb`nY][Ybž`XUgg`j]Y`Y
J Yfa]gghYb ZÄ`Y`]b`XYf`5`hYfg[ fi ddY`XYf`A ]bXYf`Ä`f][ Yb`]b
[fc» Ya `A U» Y`Ui Z[Y`\_Äfh`k YfXYbž`k Ug`c Zh`Ui ZX]Y`A]hUfVY]h]j cb
Dc`]nY]i bX`² ZYbh`]W\\_Y]h`ni fØW`ni ZØ`fYb`]gh"

@Ui h`XYf`? f]a]bU`ghUh]gh]\_`XYg`6i bXYg`_f]a]bU`Ua hYg`fß? 5Ł
k YfXYb`Ä`f`]W\`]b`8Yi hgW\`UbX`NY`b`hUi gYbXY`j cb
J Yfa]gghYba Y`Xi b[ Yb`YfZUgg" `8UVY]` \UbXY`h`Yg`g]W\`i a `fi bX
') "\$\$\$`V]g( "\$\$\$`\$` : Ä`Y`dfc` ðJ`fž`k cVY]`X]Y`5bnU\`XYf`XUi Yf`UZh
J Yfa]gghYb`XYi h`]W\` [ Yf]b[ Yf`]gh" `9g`]gh`k ]W\h][ ž`X]Y`² ZYbh`]W_Y]h
]b`gc`W\Y` : U\`bXi b[Yb`Y]bni VYn]Y\Ybž`XU`< ]bk Y]gY`j cb
Df]j UhdYfgcbYb`\`Äi Z[`YbhgW\Y]XYbX`gY]b`_ÖbbYb"

8]Y`F c`Y`XYf`gcn]U`Yb`A YX]Yb

Gcn]U`Y`A YX]Yb`gd]Y`Yb`\`Yi hni hU[Y`Y]bY`YbhgW\Y]XYbXY`F c`Y`VY]
XYf`J YfVfY]hi b[ `j cb` ðZcfa Uh]cbYb`ØVYf`j Yfa ]gghY`DYfgcbYb"
D`UhhZcfa Yb`k]Y` : UW`Vcc`\_ž`Hk]hhYf`i bX` ðghU[fUa `Yfa Ö[ `]W\Yb
Ygž`gW\`bY`Y]bY`VfY]hY`² ZYbh`]W_Y]h`ni `YffY]W\Yb" `8]Y
Dc`]nY]VY`\ÖfXYb`bi hnyb`ni bY`a YbX`X]YgY`? UbÄ`Yž`i a
: U\`bXi b[ Yb`i bX`J Yfa ]gghYba Y`Xi b[Yb`ni `j YfVfY]hYb" `8]Yg`_Ubb
X]Y`J Yfa ]h`i b[`j cb` ðZcfa Uh]cbYb`]b`Y]bYa `_ØfnYfYb

NY]hfU\ a Yb`Yf\YV`]W\`VYgW\`Yi b][Yb`i bX`X]Y`7\UbW`Yf\Ø\Ybž
X]Y`j Yfa ]gghY`DYfgcb`gW\ bY``ni`Z]bXYb"

9]b`6Y]gd]Y``XUZØf`]gh`X]Y`J Yfa ]gghYbZU\ bXi b[ `bUW\`7\]UfU`7"ž`X]Y
bUW\`]\fYf`GW`U`hi b[`]b`XYb`gc n]U`Yb`A`YX]Yb`gW\ bY``Ub`: U\fh
Ui ZbU\ a ``8]Y`Dc`nY]`k Uf`XUb`\_VUf`ZØf`X]Y`i bhYfghØhni b[`XYf
6Yj Ø`\_Yfi b[ ž`X]Y`VY]`XYf`Gi W\Y`\U`Z`"

GhUh]gh]_`j`c`b`J`Y`fa` ]gghY`b`ZÄ``Y`b`]`b` 8`Y`i`hgW\`U`b`X`

9]bY`6YhfUW\hi b[ `XYf`U`_hi Y``Yb`8`UhYb`ni`J`Y`fa` ]gghYbZÄ``Yb`[]Vh
5i ZgW\`i`gg`ØVYf`X]Y`HfYbXg]`b`X]YgYf`H\Ya`Uh]\_`" `a` `:U\ f`&`\$`&`\$`[`UV
Yg`Ui`h`6?`5`]bg[ YgUa`h` )`"&`\$`J`Y`fa` ]gghYba`Y`Xi b[ Ybž`k`c`VY]
Yhk`U`*`\*`i` `X]YgYf`:`Ä``Y`VYfY]hg`bUW\`\_i`fnYf`NY]h[ Y`Øgh`k`YfXYb
_cbbhYb" `:bgVYgcbXYfY`VY]`a`]bXYf`Ä`f][Yb`J`Y`fa`]gghYb`k`YfXYb
j`]Y`Y`]bbYf`U`V`_i`fnYf`NY]h[YZ`bXYbž`k`Ug`X]Y`6YXYi`hi b[`Y]bYf
gW\ bY``Yb`F`Y`U`_h]cb`j`cb`GY]hYb`XYf`6Y\ØfXYb`i`bX`XYf
6Yj Ø`\_Yfi b[ `i`bhYfghfY]W\h"

Ni`gÄh`n]W\`nY][`h`X]Y`GhUh]gh]_`ž`X`Ugg`X]Y`A`Y`f`Y]h`XYf
J`Y`fa`]gghYbZÄ``Y`]b`ghÄXh]gW\Yb`;`YV]YhYb`Ui`Zhf]hh" `Gc`W\Y`8`UhYb
_ØbbYb`XYf`;`YgY``gW\UZh]YfXYi`h]W\Ybž`k`]Y`b`chk`YbX][`i`bX
k`]W\h][`X]Y`Ni`gUa`a`YbUfVY]h`nk`]gW\Yb`6Øf[ Yfb`i`bX`Dc`nY]`]ghž
i`a`j`Y`fa` ]gghY`DYfgcbYb`fYW\hny]h][`Ui`Z]bXYb`ni`_ØbbYb"

8i`fW\`X]Y`5bU`mgY`gc`W\Yf`8`UhYb`i`bX`XYfYb`DfÄgYb`hUh]cb`]b`XYb
A`YX]Yb`_Ubb`Y]b`VYggYfYg`6Yk`i`gghgY]b`ZØf`X]Y`DfcV`Ya`Uh]_
[YgW\UZYb`k`YfXYbž`k`Ug`k`]YXYfi`a`ni`Y]bYf`U`\_h]j`YfYb`HY]`bU\`a`Y
XYf`²`ZYbh]W_Y]h`Ub`XYf`@Øgi`b[`gc`W\Yf`:`Ä``Y`ZØ`fh"

8YhU]`g`

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