

# Ni fØW\_'Ui g'XYf'Gca a YfdUi gY. 8 Ua d Zni [ ZU\fhYb']b'XYf'K i \`\Y]XY

9f`YVYb`G]Y`Y]b`i bj Yf[Ygg`]WXYg`K cWXYbYbXY`a ]h`XYf
DUf\_Y]gYbVU\b`K i \`\Y]XY°`5a '+"i bX`, "'GYdhYa VYf`ZU\fYb
\]ghcf]gWXY`8 Ua dZc\_ca ch]j Yb`Xi fWX`XYb`a U`Yf]gWXYb
J c`\_gdUf\_"'; Yb]Y» Yb`G]Y`Fi bXZU\fhYb`a ]h`VYY]bXfi W\_YbXYb
8 Ua dZnØ[Ybž`X]Y`U``Y`') 'A ]bi hYb`j ca '< Ui dhVU\b\cZ
UVZU\fYb": U\f\_UfhYb`g]bX`j cf`Cfh`Yf\A`h`]WX"`K Y]hYfY
9]bgÀhnY`XYf`8 Ua dZc\_ca ch]j Yb`Zc`[Yb`V]g`5bZUb[
Bcj Ya VYf"'6Ygi WXYb`G]Y`i bg`ZØf`Y]b`hc``Yg
: Ua ]`]YbYf`YVb]g°`K Y]hYfY' ₺Zcfa Uh]cbYb`Ui Z
k k k "dUf\_Y]qYbVU\b"XY"

"=a "Vi bhYb I a ZY`X 'XYg'J c`\_gdUf\_g'K i \`\Y]XY']gh'X]Y
DUf\_Y]gYbVU\b k ]YXYf'VYfY]hz'X]Y'6Ygi WXYf'a ]h']\fYb
\]ghcf]gWXYb'8Ua dZ'c\_ca ch]j Yb 'ni 'VY[Y]ghYfb"'5b 'XYb
K cWXYbYbXYb'j ca '+"'i bX', "'GYdhYa VYf'[]Vh'Yg'Y]bY'VYgcbXYfY
5hhfU\_h]cb 'ZØf'≯ b['i bX'5`h.'8Ua dZXi fWXZU\fhYb'Xi fWX'X]Y
]Xm``]gWXYb'@UbXgWXUZhYb'XYg'DUf\_g"'8]YgY': U\fhYb'V]YhYb'b]WXh
bi f'Y]b'bcghU`[]gWXYg'9f`YVb]gz'gcbXYfb'Ui WX'X]Y'A Ò[`]WX\_Y]hz'X]Y
B Uhi f'Ui Z'Y]bY'Y]bn][Ufh][Y'5fh'i bX'K Y]gY'ni '[Yb]Y»Yb"''

## 8Ua dZdfc[fUa a i bX'H]W\_YhdfY]gY

 $\begin{tabular}{ll} @f'X]Y'Yb][Yb\check{z}X]Y'g]WX'X]YgYb'bcghU`[]gWXYb'; Ybi gg'b]WXh Ybh[Y\Yb'`UggYb'k c``Yb\check{z}ghY\Yb'`H]W_Yhg'ni f'J YfZ@[i b["'8]Y : U\f_UfhYb'Z@f'X]Y'\U`VghØbX][Yb'Fi bXZU\fhYb'_ObbYb'gck c\``]b XYb'N@[Yb'U`g'Ui WX'Ua 'GWXU`hYf']a '<Ui dhVU\b\cZ'XYf DUf_Y]gYbVU\b'Yfk cfVYb'k YfXYb"'8Yf'DfY]g'Z@f'Y]bY': U\fhž Y]bgWX`]Y\b']WX'XYg'8Ua dZni gWX`U[gž'VYhfÀ[h'*ž)$'9i fcž'k À\fYbX?]bXYf'Z@f') ž$$'9i fc'a ]hZU\fYb'_ObbYb"'8]Yg'a UWXh'X]Y 5hhfU_h]cb'b]WXh'bi f'Z@f': Ua ]`]Ybž'gcbXYfb'Ui WX'Z@f 6U\b`]YV\UVYf'i bX'BcghU`[]Y!: Ubg'gY\f'UhhfU_h]j'''' } \end{tabular}$ 

"8]Y A Ò[`]W\\_Y]hžk À\fYbX XYf": U\fhYb X]Y Zf]gW\Y @ Zhi bX X]Y k i bXYfgW\ÒbY B Uhi f XYf K i \`\Y]XY ]b j c ``Yb NØ[ Yb ni [Yb]Y» Ybžn]Y\h']a a Yf k ]YXYf nU\`fY]W\Y 6Ygi W\Yf Ub" 8]Y fi \][ Y i bX [ fØbY I a [ YVi b[ 'XYg DUf\_g V]YhYhY]bYb gW\ÒbYb?cbhfUgh ni f'<Y\_h]\_ XYg GhUXh`YVYbgžk cXi fW\ X]Y 8 Ua d ZZU\fhYb ni Y]bYa 'Ybhgd UbbYbXYb '9f`YVb]g ZØf U``Y k YfXYb"

#### K Y]hYfY 8 Ua dZZU fhYb ]a < YfVgh

"8]Y 'DUf\_Y]gYbVU\b`\Uh'Ui W\']b'XYb'\_ca a YbXYb'K cW\YbYbXYb gdUbbYbXY'8Ua dZYf`YVb]ggY'[Yd`Ubh": c`[YbXY'HYfa]bY'g]bX j cf[YgY\Yb.'&%"#&&"'GYdhYa VYfž') "#\* "'C\_hcVYfž'%- "#&\$"'C\_hcVYf i bX'&"# "'Bcj Ya VYf"'8]Yg'[]Vh'XYb'6Ygi W\Yfb'X]Y'A Ò[`]W\\_Y]hž X]Y'\]ghcf]gW\Yb'NØ[Y'Ui W\']b'XYf'<YfVghgU]gcb'ni 'Yf`YVYbž'k Ybb X]Y'6Ài a Y'Vi bh'[YZÀfVh'g]bX'i bX'X]Y'@i Zh'Ub[YbY\a'\_Ø\`'k]fX"''

"K Yf'a Y\f'ØVYf'X]Y'DUf\_Y]gYbVU\b'i bX']\fY'5b[YVchY'YfZU\fYb a  $\grave{O}W$ hYž'\_Ubb'X]Y'c\\Z]n]Y``Y'K YVgY]hY'VYgi W\Yb'c\\XYf'Y]b'6`]\\\_'Ui Z X]Y': U\\Vcc\_!GY]hY'\XYf'DUf\_Y]gYbVU\b'k Yf\\ZYb'''<]Yf'\Z]b\XYb'g]\\\U\_hi Y``Y'\D\\Zcfa Uh]cbYb\\Z'J\YfUbghU`hi b[g\]bk Y]gY'i bX'gdUbbYb\XY 9]bV`]\\\\_Y']b'\X]Y'<]ghcf]Y'\XYf'6U\b'''

``8Yf`5bV`]W\_`XYf`XUa dZYbXYb`@c\_ca ch]j Ybž`X]Y`ØVYf`X]Y GWX]YbYb`gWXbi ffYbž`k YW\_h`b]WXh`bi f`9f]bbYfi b[Yb`]b`U`hYb 9]gYbVU\bZUbgž`gcbXYfb`gcf[h`Ui WX`ZØf`ghUi bYbXY`?]bXYfUi [Yb" 8]Y`8Ua dZY]gYbVU\b`\Uh`ØVYf`X]Y`J\\fY`\]bk Y[`b]WXhg`j cb`]\fYa FY]n'j Yf`cfYbž'i bX'X]Y'\_ca a YbXYb'K cWXYbYbXYb'`UXYb'XUni Y]bž'Ui Z'Y]bY'\_`Y]bY'NY]hfY]gY'ni '[Y\Ybž'X]Y'gck c\``6]`Xi b['U`g Ui WX'?i fnk Y]``V]YhYh'''

``: Øf'k Y]hYfY'=bZcfa Uh]cbYb'i bX'H]W\_Yhg.
6Ygi W\Yb'G]Y'k k k "dUf\_Y]gYbVU\b"XY'cXYf'Zc`[Yb'G]Y'i bg'Ui Z
: UW\Vcc\_'i bhYf'k k k "ZUW\Vcc\_"Wca #dUf\_Y]gYbVU\b"XY"``

"8]Y'DUf\_Y]gYbVU\b'K i\`\Y]XY']gh'b]W\h'bi f'Y]b'VY`]YVhYf
5i gZi [ gcfh'ZØf': Ua ]`]Yb'i bX'9]gYbVU\bZUbgž'gcbXYfb'Ui W\'Y]b
VYXYi hYbXYg'GhØW\_'\]ghcf]gW\Yf'HYW\b]\_'i bX'?i `hi f']b'6Yf`]b"'8]Y
6U\b'k i fXY'%-)' '[ Y[ fØbXYh'i bX'\Uh'g]W\'gY]hXYa 'U`g'Y]b
k ]W\h][ Yg'9`Ya Ybh'XYf': fY]nY]h[ YghU`hi b[ ']b'XYf'GhUXh'YhUV`]Yfh"
A ]h']\fYb'ZUfVYbZfc\Yb'K U[ [ cbg'i bX'8 Ua dZc\_ca ch]j Yb'n]Y\h
X]Y'DUf\_Y]gYbVU\b'A\f`]W\'HUi gYbXY'j cb'6Ygi W\Yfb'Ubž'X]Y'X]Y
]Xm``]gW\Yb'@UbXgW\UZhYb'XYg'Jc`\_gdUf\_g'K i\`\Y]XY'[ Yb]Y\'Yb
a OW\hYb"''

### 6YgcbXYf\Y]hYb XYf 8Ua dZ`c\_ca ch]j Yb

 $\label{thm:continuous} $$ "8 Y j Yfk YbXYhYb 8 Ua dZc_ca ch] yb g]bX a Y]gh Ui g XYf NY]h XYf 8 Yi hgWX Yb F Y]WX gVU\b ii bX k i fXYb gcf[ Z\hat{A}^h][ fYghUi f]Yfh\hat{Z} i a XYb 6 Ygi WX Yfb Y]b Ui h\Ybh]gWX Yg 9 f YVb]g ni "V]YhYb " 8 ]YgY @c_g g]bX HY] \text{XYf}? \text{Y}bVU\b! HfUX]h]cb 8 Yi hgWX \text{UbXg\hat{Z}} k c gWX a U gdi f][ Y 6 U\bYb V]g ]bg & $" \text{Y}f i bXYfh X]Y \text{AbX}]WXYb FY[ ]cbYb a ]h XYb Gh\hat{X}hYb j YfVUbXYb " \= a : U \text{Y} XYf$ 

DUf\_Y]gYbVU\b`\UbXY`h'Yg'g]W\`i a 'Y]bY'\*\$\$!a a !
GW\a U`gdi fVU\bž'X]Y']a 'J Yf[`Y]W\`ni 'GhUbXUfXgdi fVU\bYb'Y]bY
UbXYfY'hYW\b]gW\Y'6Ui k Y]gY'i bX'Bi hni b['\Uh"''

"K À\fYbX:XYf": U\fhYb'\UVYb"; ÀghY:X]Y:A Ò[`]WX\_Y]hž']b:X]Y ZUgn]b]YfYbXY:K Y`h:XYf'8 Ua d ZhY W\bc`c[]Y:Y]bni hUi W\Yb" : UW\\_i bX][Y:A]hUfVY]hYf'ghY\Yb'VYfY]hž'i a ::  $fU[Yb'ni VYUbhk cfhYb'i bX']bhYfYggUbhY': U_hYb'ni 'XYb'@c_ca ch]j Yb'i bX]\fYf'; YgW\]W\hY'ni 'hY]`Yb''8]Yg'a UW\h'X]Y'DUf_Y]gYbVU\b'ni Y]bYa 'VYgcbXYfYb'9f`YVb]g'Z<math>\emptyset$ f'\$ b['i bX'5`h'''

## ? i `hi fY``Y 'i bX'[ YgY``gW\ UZh`]W\ Y '6YXYi hi b[

 $\begin{tabular}{ll} \hline ``8 ]Y`DUf_Y]gYbVU\b`\Uh`b]W\h`bi f`Y]bY`hci f]gh]gW\Y`: i b_h]cbž \\ gcbXYfb`gd]Y`h`Ui W\`Y]bY`k ]W\h][ Y`Fc``Y`]b`XYf`; Ya Y]bgW\UZh'j cb \\ 6Yf`]b"`G]Y`cf[ Ub]g]Yfh`fY[ Y`a À»][ `J YfUbghU`hi b[ Ybž`VY]`XYbYb \\ X]Y`6Ygi W\Yf`X]Y`; YgW\]W\hY`XYf`9]gYbVU\b`i bX`X]Y`6YXYi hi b[ XYg`J Yf_Y\fg`]b`]\fYf`FY[ ]cb`bÀ\Yf`_YbbYb`YfbYb`_ObbYb"`8]YgY \\ 5_h]j ]hAhYb`ZOfXYfb`XUg`<math>4$ bhYfYggY`Ub`HYW\b]\_`i bX`; YgW\]W\hY`i bX gW\UZZYb`gca ]h`Y]bYb`FUi a `Z\Of``Y\ffY]W\Y`9f`YVb]ggY"`` \end{tabular}

"8 UbYVYb 'k ]fX 'X]Y '6 U\b 'U`g'D`UhhZcfa 'ZØf'j YfgW\]YXYbY
\_i `hi fY``Y'J YfUbghU`hi b[Yb'[Ybi hnh": YghYž'?cbnYfhY'i bX 'A Àf\_hY
Z]bXYb '\Ài Z][ ']a 'Ni gUa a Yb\Ub[ 'a ]h'XYf'DUf\_Y]gYbVU\b 'ghUhhž
k Ug'ni 'Y]bYf'6Y`YVi b[ 'XYg'[YgUa hYb'Jc`\_gdUf\_g'K i \`\Y]XY
VY]hfÀ[ h" 8]YgY'J YfUbghU`hi b[Yb'ZÒfXYfb'X]Y'; Ya Y]bgW\UZh'i bX
XUg'A]hY]bUbXYf'XYf'6Ygi W\Yf"''

.

8YhU]`g

6Ygi WXYb G]Y i bg Ui Z b!U[ "XY