

9| d`cfY'h\Y'`UhYgh'XYj Y`cda Ybhg']b'HU``U\UggYYž']bWi X]b[ncb]b['W\Ub[Ygž'WcbgYfj Uh]cb'YZZcfhgž'UbX'dc`]h]WU`'g\]Zhg]a dUWh]b[':`cf]XU"



HU``U\UggYYz': `cf]XU'!'Cb'* bY') z'&\$&) z'U'bi a VYf'cZ'g][b]Z]WUbh `cWU``UbX'Ybj]fcba YbhU``XYj Y`cda Ybhg'UfY'hU_]b['WYbhYf'ghU[Y]b': `cf]XU"'BchUV`mz'; cj Yfbcf'Fcb'8YGUbh]g'UbX'h\Y'ghUhY'7UV]bYh UfY'gYh'hc'Yj U`i UhY'hk c'dfcdcgYX'XYU`g'h\Uh'U]a 'hc'WcbgYfj Y Ufci bX'+*z\$\$\$'UWfYg'cZ'`UbX']b'Bcfh\': `cf]XU"'K]h\'bYUf`m'`%%, a]``]cb'U``cWUhYX'Zcf'WcbgYfj Uh]cb'YUgYa Ybhg']b'6U_Yfz'6fUXZcfXz UbX'I b]cb'Wci bh]Ygz'h\YgY']b]h]Uh]j Yg'fYZYWh'U'[fck]b[Wca a]ha Ybh'hc'Ybj]fcba YbhU`'dfYgYfj Uh]cb']b'U'ghUhY'[fUdd`]b[k]h\'fUd]X'XYj Y`cda Ybh'UbX'\UV]hUh'`cggz'Ug'HU``U\UggYY FYdcfhg'\][\`][\hg"

7 cbgYfj Uh]cb YUgYa YbhgžUg XYZ]bYX Vm h\Y: `cf]XU 8 YdUfha YbhcZ'9bj]fcba YbhU``DfchYWh]cbžgYfj Y hc dfchYWh `UbX'cf'k UhYf'UfYUgžfYhU]b]b['h\Ya']b'h\Y]f'bUhi fU``ghUhY'k\]`YU``ck]b['`UbXckbYfg'hc'Yb[U[Y']b'`ck!]adUWh'U[f]W'`hi fU`UWh]j]h]Yg"'H\YgY'`Y[U``U[fYYaYbhg'UfY'dUfh]W'`Uf`m'g][b]Z]WUbhVYWUi gY'h\Ym'\Y`d'g\]Y`X'j]hU``\UV]hUhg'Zfca'h\Y'YbWfcUW\aYbhcZ'i fVUb'XYjY`cdaYbhž'dfcj]X]b['Vch\'Ybj]fcbaYbhU``UbXYWcbca]W]bWYbh]jYg"

5 '8 i U` '6 Y b Y Z]h. 'GhUhY 'Ub X '@Ub X c k b Y f g 'F Y Ud F Y k Uf X g

H\YgY'WcbgYfj Uh]cb']b]h]Uh]j Yg'VYbYZ]h'bch'cb`m'h\Y'ghUhY'Vi h'U`gch\Y'`UbXck bYfg"'6m'[fUbh]b['cf'gY``]b['WcbgYfj Uh]cb'YUgYa Ybhgž`UbXck bYfg'fYhU]b'h]h`Y'hc'h\Y]f'dfcdYfh]Yg'k\]'Y'fY`]bei]g\]b[
WfhU]b'XYj Y`cda Ybh'f][\hg"'H\]g'U``ck g'Zcf'Wcbh]bi YX
U[f]W'`hi fU`'i gY'i bXYf'gdYW]Z]WfYghf]Wh]cbgž'ZcghYf]b['U'VU`UbW'VYhk YYb'WcbgYfj Uh]cb'UbX'i h]`]hm"'H\Y'I b]j Yfg]hm'cZ': `cf]XU g
: `cf]XU'@UbX'GhYk UfX'dfc[fUa 'gi [[Yghg'h\Uh'h\YgYYUgYa Ybhg'WUb'Yj Yb'm]Y`X'hUI 'UXj UbhU[Yg'Zcf'`UbXck bYfgž'k\]WX
UXXg'hc'h\Y]f'UddYU`"

: i fh\ Yfa cfYž'a cb]hcf]b['h\ YgY 'YUgYa Ybhg']g'Wfi W]U`"'H\ Y'CZZ]WY cZ'9bj]fcba YbhU`'GYfj]WYg'dYfZcfa g']bgdYWh]cbg'Yj Yfm'h\ fYY mYUfg'hc 'Ybgi fY 'Wca d`]UbWY'k]h\ 'h\ Y'hYfa g'`U]X'ci h']b'h\ YgY U[fYYa Ybhgž'Zfca '`]a]hUh]cbg'cb'Wcbghfi Wh]cb'hc'a UbU[Ya Ybh dfUWh]WYg'h\ Uh'dfchYWh'h\ Y'Ybj]fcba Ybh"

HUI '=bWbh]j Yg'k]h\ '7cbgYfj Uh]cb 9UgYa Ybhq

H\Y'Z|bUbW]U`]bWbh]j Yg'Zcf'dUfh]W]dUh]b[']b'WcbgYfj Uh]cb
YUgYa Ybhg'UfY'bchUV`Y'': cf']bghUbW'žh\Y'\FG'U``ck g'hUl
XYXi Wh]cbg'Zcf'h\Y'j U`i Y'cZYUgYa Ybh'[]Zhgž'k]h\'dchYbh]U`
XYXi Wh]cbg'fYUW\]b['i d'hc'%\$\$i 'cZ'UX'\fghYX'[fcgg']bWca Y'Zcf
ei U`]Zm]b['ZUfa Yfgž'Ug'gdYW]Z]YX'i bXYf'h\Y'DYbg]cb'DfchYWh]cb
5Wh'''H\]g'WUb'VY'U'Wca dY``]b['fYUgcb'Zcf'`UbXck bYfg'hc'Wcbg]XYf
dfYgYfj]b['h\Y]f'`UbXž'YgdYW]U``m'k\Yb'Wca V]bYX'k]h\'`cWU``hUl
Yl Ya dh]cbg'Zcf'dfcdYfhm'Ybj Y`cdYX']b'WcbgYfj Uh]cb'YUgYa Ybhg''

<ck Yj Yfž']h g'YggYbh]U``Zcf``UbXck bYfg'hc'i bXYfghUbX'h\Y
]a d`]WUh]cbg'cZ'gi W\'U[fYYa Ybhg"'K \]`Y'h\Ym'Xc'fYhU]b'ck bYfg\]d
cZ'h\Y``UbXž'g][b]Z]WUbh'fYghf]Wh]cbg'Udd`m'fY[UfX]b['XYj Y`cda Ybh
UbX'fYgci fWY'YI hfUWh]cb"'5g'h\Y': `cf]XU'8 9D'bchYgž']``]W]h
UWh]j]h]Yg'gi W\'Ug'Xi a d]b['k UghY'cf'fYa cj]b['j Y[YhUh]cb'WUb
`YUX'hc'dchYbh]U``j]c`Uh]cbgž'a U_]b[']h'Wfi W]U``Zcf'`UbXck bYfg'hc
UX\YfY'hc'6Ygh'A UbU[Ya Ybh'DfUWh]WYg'YghUV`]g\YX']b'h\YgY
YUgYa Ybhg"</pre>

Dc`]h]WU`@UbXgWUdY UbX 7ca a i b]hm = a dUWh

 $\label{thm:localization} $$H\Y'VUW_Xfcd'cZ'h\YgY'Ybj]$$ fcba YbhU`']b]h]Uh]jYg'ibZc`Xg'Ua]X$$ bchUV`Y'dc`]h]WU`'g\]Zhg']b':`cf]XU''':cfa Yf'7cb[fYgga Ub'8Uj]X$$ $$`mg'gk]hW\'hc'h\Y'8Ya cWfUh]WDUfhm'UbX'UbbcibW'aYbh'hc'fib Zcf';cjYfbcf']b'&$&*'ibXYfgWcfYg'U'W]aUhY'cZ'W\Ub[Y'h\Uh'aUm]bZiYbW'ZhifY'WcbgYfjUh]cb''Y[]g`Uh]cb''H\]g'Yjc`j]b[`UbXgWUdY']g'Wf]h]WU`'Ug'fYg]XYbhg'UbX'`Uk aU_Yfg'[fUdd'Y'k]h\VU`UbW]b['YWcbca]WXYjY`cdaYbh'U[U]bgh'h\Y'bYYX'Zcf'ghfcb[Ybj]fcbaYbhU`'ghYkUfXg\]d"$

#D'WcbWi g]cbž'k]h\'h\Y'ghUhY g'UhhYbh]cb'cb'g][b]Z]WUbh'ncb]b[W\Ub[Ygž'UWUXYa]Wdc`]W]Ygž'UbX'`YUXYfg\]d'hfUbg]h]cbgž
: `cf]X]Ubg'g\ci `X'fYa U]b'j][]`Ubh'UVci h'\ck 'gi W\'XYW]g]cbg
]a dUWh'Vch\'h\Y'Ybj]fcba Ybh'UbX'h\Y]f'Wca a i b]h]Yg"'5g'k Y
bUj][UhY'h\YgY'XYj Y`cda Ybhgž'h\Y'dfcdcgYX'WcbgYfj Uh]cb'XYU`g
ghUbX'ci h'Ug'U'VYUWcb'cZ'\cdY'Zcf'gUZY[i UfX]b[': `cf]XU g'bUhi fU`\Yf]hU[Y"

8 Y hU]`g	
Cfh	HU``U\UggYYž': `cf]XU
EiY``Yb	hU``U\ UggYYfYdcfhg"Wca
	• Z`cf]XUXYd"[cj
	• dfc[fUa g"]ZUg"i Z`"YXi