

## 6UX 6fUa VUWX. Ni gÀhn`]WX Y FYhhi b[gk UWX Y k À\fYb X 6 - &!Gd Yffi b[°

=a 'Gca a Yf'&\$&) 'k ]fX'6UX'6fUa VUW 'Y]bY'hYa dcfÀfY FYhhi b[gk UW Y'Yf\U`hYbži a 'k À\fYbX'XYf'6 - &!Jc``gdYffi b['BchZÀ``Y'ni 'VYX]YbYb"

6UX 6fUa VUW žis Yi hgW `Ub X !! = a `Gca a Yf'&\$&) `k ]fX `X]Y ; Ya Y]bXY 6UX 6fUa VUW Xi fW X]Y ghUh]cbAfY 6YfY]hghY ``i b[Y]bYg'ni gAhn`]WXYb FYhhi b[gk U[Ybg'i a ZUggYbX 'Ui Z'X]Y UbghY\YbXYb < YfUi gZcfXYfi b[Yb 'fYU[]YfYb" Nk ]gW Yb 'A ]hhY '> b] i bX '5i [i gh'k]fX 'XYf'bYi Y FYhhi b[gk U[Yb 'fi bX 'i a 'X]Y 'I \f'ni f JYfZØ[i b['ghY\Ybž'i a 'X]Y '6Øf[Yf']a 'GØXn]dZY `'XYg Jc[h`UbX\_fY]gYg'gW bY ``i bX 'YZZY\_h]j 'ni 'j Yfgcf[Yb" 8]YgY A U» bU\a Y'\_ca a h']b FYU\_h]cb 'Ui Z'X]Y 'VYj cfghY\YbXYb Jc ``gdYffi b[Yb 'XYf'6' - &ž'X]Y 'U`g'Y]bn][Y'Ni ZU\fhgghfU» Y']b 'X]Y FY[]cb 'X]Ybhž'VYf]WXhYh'X]Y : fY]Y 'DfYggY"

8]Y'Jc``gdYffi b[Yb'XYf'6'-&'g]bX'bchk YbX][ži a ii a ZUb[fY]WXY 6Ui UfVY]hYb'Xi fWxni ZØ\fYb"'+b'X]YgYa 'Ni gUa a Yb\Ub['d`Ubh'X]Y; Ya Y]bXY'X]Y'Gi WXY'bUWX'Y]bYa '[YY][bYhYb'GhUbXcfh'ZØf'X]Y hYa dcfÀfY'FYhhi b[gk UWXY']a 'A Àfn"'8]Yg']gh'VYgcbXYfg'k]Wxh][ž XU'X]Y'5bZU\fh'j cb'XYf'j cf\UbXYbYb'FYhhi b[gk UWXY']b'6UX 9`ghYf'bUWX'6UX'6fUa VUWX'VYfY]hg'nY\b'A]bi hYb'VYhfÀ[h''+b'XYb 6Ui d\UgYb'k]fX'ni gÀhn`]WX'Y]b'5a dY`j Yf\_Y\f'Y]b[Yf]WXhYhž'i a XYb'JYf\_Y\fgZi gg'ni 'fY[i`]YfYb"

5bU`mgY'XYf'FYhhi b[gX]YbghY']b 8Yi hgWX`UbX

8]Y'6YXYi hi b['Y]bYg'ni j Yf`Àgg][Yb'FYhhi b[gX]YbghYg'k]fX'Xi fWXY]bY'Vi bXYgkY]hY'5bU`mgY'i bhYfghf]WXYbž'X]Y'U``Y'j]Yf'\*J\fY

8]Y'Ghi X]Y'nY][hz'XUgg']b'i fVUbYb'FY[]cbYb'ØVYf'XcddY'h'gc'j]Y'Y
9]bgÀhnY'j YfnY]W\bYh'k YfXYb'k]Y']b'`ÀbX`]W\Yb'; YV]YhYb"

\$\psigVYgcbXYfY'k UfYb'fi bX') 'A]``]cbYb'9]bgÀhnYz'U`gc'', 'DfcnYbhz'
?fUb\_YbhfUbgdcfhYz'k À\fYbX'X]Y'BchZÀ``Y'a]h', z%'A]``]cbYb
9]bgÀhnYb'Y]bYb'g][b]Z]\_UbhYb'5bhY]``\UhhYb"'8]Y'BchZU``fUhY
VYhfi ['-+z''9]bgÀhnY'dfc'\\fibX'\%"\$\$\$'9]bk c\bYf'i bX'\Uh'g]W\

[a'JYf[`Y]W\ni'ZfØ\YfYb'\\J\fYb'\Y]W\h'Yf\\O\h'

## < YfUi gZcfXYfi b[ Yb i bX 9bhk ]W\_ i b[ Yb</pre>

 $\label{thm:converse} Hfchn: XYf: < YfUi gZcfXYfi b[Ybž:X]Y:Xi fW. X]Y:DUbXYa ]Y YbhghUbXYb:g]bXž:VY]VYb:X]Y:9f[YVb]ggY:XYf:5bU:mgY:a ]h:XYb J cf'U\fYb:j Yf[ `Y]W.VUf":8]Y:E i U`]hÀh:i bX:GW.bY:`][ _Y]h:XYf 6YX]YbgW.bY:`][ _Y]h:i bX:!e i U`]hÀh:g]bX:k YgYbh:]W.Y:?Ybb[fO) Ybž Ui Z:X]Y:X]Y:9ZZ]n]Ybn:XYg:FYhhi b[gX]YbghYg:VY]b\U:hYh":8]Y a ]hh:YfY:<]`ZgZf]gh:`U[ `Vi bXYgk Y]h:VY]:, ž+ `A ]bi hYbž:k cVY]:-) DfcnYbh:XYf:9]bgÀhnY:]bbYf\U:V:j cb:%* ž&:A ]bi hYb:YffY]W.h k i fXYb"$ 

8]Y VYj cfghY\YbXY G]hi Uh]cb ]b 6UX 6fUa VUWX \_Ubb 'U`g'Y]b
5bgUhn [ YgY\Yb k YfXYbži a 'X]Y @Y]ghi b[ gZÀ\][ \_Y]h XYg
FYhhi b[ gX]YbghYg'Ui WX ]b NY]hYb j cb ]b ZfUghfi \_hi fY ``Yb
JYfÀbXYfi b[ Yb ni '[ Yk À\f`Y]ghYb" A ]h XYf a cV] Yb I bhYfghØhni b[
k ]fX X]Y ; Ya Y]bXY j Yfgi WXYbž X]Y J Yfgcf[ i b[ gg]WXYf\Y]h ]b
Y]bYa '\_\_f]h]gWXYb NY]hfUi a 'Ui ZfYWX hni Yf\U`hYb"

8 Y hU]`g	
J c f ZU``	B c hZU``

8 YhU]`g	
Cfh	6UX 6fUa VUW ž8Yi hgW `UbX
EiY``Yb	<ul><li>k k k "ZfY]YdfYggY"XY</li></ul>
	• k k k "VUgh"XY

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z. 'b!U[ "X Y