BUd`Yg`Df]XY: Ygh'8fU[g'7cbhfcj Yfgm =bXccfg'5a]X'@Y[U`6Uhh`Y°



Bcff]g·7YbhYfž·Bud`Ygž: `cf]Xuž·I G5·!·Cb·¾ bY·+ž·&\$&) ž
Bud`Yg·Df]XY: Ygh-]W_YX·cZi·Ua]X·U·k \]f`k]bX·cZiwcbhfcj Yfgmž
gYhh]b['h\Y·ghU[Y·Zcf·U·j]VfUbh·XfU['g\ck 'h\Uhii bZc`XYX`]bXccfg
Xi Y·hc·U·g][b]Z]wUbh·`Ugh!a]bi hY·ZYXYfU`·Wci fh·fi `]b["·Cf][]bU``m
d`UbbYX·Zcf·7Ua V]Yf·Duf_ž·h\Y·ci hXccf·dYfZcfa UbWi·k Ug
UVfi dh`m·fY`cWJhYXž·Ug·h\Y·Bud`Yg·8U]`m·BYk g·fYdcfhYX"·H\Y
9`Yj Ybh\·7]fW]h·7ci fh·cZ·5ddYU`g·XYWUfYX·h\Uh·BUd`Yg·Wci `X
YbZcfW fYghf]Wh]cbg·fYei]f]b['XfU['dYfZcfa UbWig·hc·VY·\Y`X
]bXccfg·UbX·`]a]hYX·hc·UXi `hgž·fYj Yfg]b['U·df]cf·fi `]b['h\Uh
ZUj cfYX·h\Y·di V`]W[Uh\Yf]b[g·ci hXccf·gYhh]b["

H\Y'Yj Ybh'Wca a YbWX'Ufci bX'%%'U"a "'UbX'gUk ']hg'Z]fgh'XfU[dYfZcfa UbW''1 gh'UZhYf'bccbž'Vi h'bch'k]h\ci h']hg'g\UfY'cZ'XfUa U"

 $\label{lem:decomposition} Dfc hY ghg `Yfi dhY X `ci hg] XY `h\ Y `j Ybi Y \check{z}'k]h\ `XYa cbghf Uhcfg `j c] W]b[h\ Y] f`cdd cg]h] cb `hc `h\ Y `Yj Ybhž `c ZhYb `fY ZY fYb W]b[`V]V `] WU ``hYI hg `Ug h\ Ym [Uh\ YfY X `Ua]X `\ Y][\ hYbY X `gY W f]hm '`H\]g `fc Vi gh `gY W f]hm d`Ub `k Ug `WfUZhY X `]b `Wc ``UV cfUh] cb `k]h\ ``c WU ```Uk `Yb Zcf W a Ybhž Ybgi f]b[`h\ Y `gUZY hm `c Z `UhhYb XYYg `Xi f]b[`h\]g `Wc bhYbh] ci g g\ ck WUgY `c Z `gY `ZIYI dfYgg] cb "$

@Y[U`6UW_[fcibX

5h·h\Y'\YUfhcZ'h\Y'`Y[U``hi gg`Y`k YfY`h\Y'dYfa]hh]b[']ggi Yg`ZUWXX VmB Ud`Yg`Df]XY''H\Y'W]hm`\UX'XYb]YX'U'dYfa]h'Zcf'h\Y'ci hXccf Yj Ybhž'dfca dh]b['B Ud`Yg`Df]XY'hc`Z]`Y'U'ZYXYfU```Uk gi]h''5 'ZYXYfU` '\X[Y']b]h]U``m'fi `YX']b'ZUj cf'cZ'h\Y'df]XY'cf[Ub]nUh]cbž'ghUh]b[h\Uh'h\Y'W]hm g`fYghf]Wh]cbg'j]c`UhYX'h\Y':]fgh'5a YbXa Ybh'f][\hg'' < k Yj Yfž'h\Y'fYWYbh'UddYU`g'Wci fh'XYW]g]cb'gk i b['h\Y'dYbXi `i a VUW_']b'ZUj cf'cZ'h\Y'W]hmž'Ya d\Ug]n]b['h\Uh'h\Y'XfU['dYfZcfa UbWYghU[Y'Wcbgh]hi hYX'U'``]a]hYX'di V`]WZcfi a 'k]h\'fYXi WYX':]fgh 5a YbXa Ybh'dfchYWh]cbg'''H\Y''\X[Ygž'a Ubm'Uddc]bhYX'Xi f]b['h\Y Hfi a d'UXa]b]ghfUh]cbž'fYUgcbYX'h\Uh'B Ud`Yg`Df]XY'\UX'XY`UmYX hcc'`cb[']b'WXU``Yb[]b['h\Y'W]hmg'dYfa]h'WcbX]h]cbgž'k \]WX'\UX

A Uh'GhUj Yf'cZ'@]VYfhm'7ci bgY`'j c]WXX'gi ddcfh'Zcf'h\Y'fi `]b[ži bXYfgWcf]b['h\Y'g][b]Z]WUbW'cZ'di V`]WgUZYhm'Ua]X'h\Y'cb[c]b[XYVUhYg'gi ffci bX]b['XfU['dYfZcfa UbW'g"'A YUbk \]`Yž'¾ X[YBUbWh'; "'5Vi Xi ž'U'6]XYb'Uddc]bhYYž'X]ggYbhYXž'fU]g]b[']a dcfhUbh ei Ygh]cbg'UVci h'h\Y'fUa]Z]WUh]cbg'cZ'`]a]h]b['ZfYY'gdYYW\'i bXYfh\Y'[i]gY'cZ'gUZYhm''Ei Ygh]cbg'UVci bX.'5fY'dYfZcfa UbW'g'`]_Yh\YgY'fYU``m'h\fYUhg'hc'di V`]WcfXYfž'cf'a YfY`m'Yl dfYgg]cbg'cZ]XYbh]hm'UbX'Ufh3

H\Y'6][[Yf'D]Whi fY

8fu['dYfZcfa UbWYg'\Uj Y'k]hbYggYX'U'fYa Uf_UV`Y'gi f[Y']bdcdi `Uf]hmž'YgdYW]U``m'h\Ub_g'hc'a U]bghfYUa 'd`UhZcfa g'`]_YFi DUi` g'8fU['FUWY" '<ck Yj Yfž'h\Y'f]gY'cZ'h\YgY'YbhYfhU]b]b[gdYWhUWYg'U`gc'dUfU``Y`g']bWfYUg]b['`Y[]g`Uh]j Y'gWfi h]bm'UWfcgg h\Y'I b]hYX'GhUhYg"'5WWcfX]b['hc'U'ZYUhi fY'cb':]fgh'5a YbXa Ybh

7YbhYfž'Uh'`YUgh'%('ghUhYg'\Uj Y']bhfcXi WYX'V]``g'hUf[Yh]b['XfU[g\ck gž'cZhYb'W]h]b['WcbWYfbg'UVci h'h\Y]f'Uddfcdf]UhYbYgg'Zcf W\]`XfYb"'K\]`Y'XfU['g\ck g'YbWUdgi `UhY'U'f]W\'UffUm'cZ dYfZcfa UbWY'Ufhž']bWi X]b['a i g]Wz'XUbWYz'UbX'Wca YXmž'h\cgY UXj cWUh]b['Zcf'fYghf]Wh]cbg'Uf[i Y'h\Ym'WUb'WcbhU]b'a UhYf]U`g XYYa YX'i bqi]hUV`Y'Zcf'mci b[Yf'Ui X]YbWYg"

H\Y'YggYbWY'cZ'h\Y'XYVUhY'\]b[Yg'cb':]fgh'5a YbXa Ybh'f][\hg"
A Ubm'g\UfY'h\Y'j]Yk 'h\Uh'`]j Y'dYfZcfa UbWYgž']bWi X]b['XfU[ž'ZU``ibXYf'dfchYWhYX'YIdfYgg]j Y'WcbXiWh'\ck Yj Yfž'fYghf]Wh]cbg'dcgYXVm'[cj Yfb]b['VcX]Yg'cZhYb'a YYh'Z]YfWY'`Y[U`'W\U``Yb[Yg"'8Ygd]hYh\Y'cb[c]b['Wcbhfcj Yfgmž'ai`h]d`Y'Wcifh'fi`]b[g'cb'XfU[`Y[]g`Uh]cb'\Uj Y'ibXYfgWcfYX'h\Y'Wcad`YI]h]Yg'giffcibX]b['ZfYYgdYYW\'UbX'diV`]WgUZYhmž'fU]g]b[']adcfhUbh']ad`]WUh]cbg'ZcfYIdfYgg]cb'UbX'Ufh]gh]WdYfZcfaUbWY"

5g'BUd'Yg'Df]XY': Ygh'i bZc'Xg']bXccfgž']hg'Zi hi fY'fYa U]bg
i bWfhU]b'Ua]X'g\]Zh]b[''Y[U''`UbXgWUdYg'UbX'gcW]YhU`'XYVUhYg"
H\Y'VfUj Y'XfU['dYfZcfa Yfg'hcc_'hc'h\Y'ghU[Yž'Wc'`YWh]b['WUg\
XcbUh]cbg'Zfca 'UhhYbXYYgž'Ug'h\Ym'k YUj YX'h\fci [\'U'hUdYghfm'cZdyfZcfa UbWY'Ufh cbY'h\Uh'gca Y'Uf[i Y'XYgYfj Yg'dfchYWh]cbi bXYf'h\Y'`Uk ž'k \]'Y'ch\Yfg'WcbhYbX'a i gh'VY'fY[i `UhYX"
BUj][Uh]b['h\]g'Yj c'j]b[''UbXgWUdYž'BUd'Yg'UbX'VYmcbX'[fUdd'Yk]h\'\ck 'hc'ghf]_Y'U'VU`UbWY'h\Uh'\cbcfg'Vch\'ZfYYXca 'cZ

H\Y'X]U'c[i Y'gi ffci bX]b['XfU['dYfZcfa UbW'g']g'ZUf'Zfca 'cj Yf" 5bX'Ug'Yj Ybhg'`]_Y'BUd`Yg'Df]XY': Ygh'Wcbh]bi Y'hc']bgd]fY'UbX dfcj c_Y'X]gW' gg]cbž'Wca a i b]h]Yg'UWfcgg'h\Y'bUh]cb'k]``'VY _YYd]b['U'WcgY'YmY'cb'k \Uh'Wca Yg'bYI h"'K]``'h\Y'`Y[U`ZfUa Yk cf_'UXUdh'hc'Zi ``m'Ya VfUWY'h\YgY'j]VfUbh'YI dfYgg]cbg'cZ]XYbh]hmž'cf'k]``'fYghf]Wh]cbg'Wcbh]bi Y'hc'gh]ZY'WfYUh]j]hm3

| 8 YhU]`g | |
|----------|--|
| Cfh | Bcff]g [·] 7YbhYfž [·] BUd`Ygž [·] : `cf]XUž [·] IG5 |
| EiY``Yb | • k k k "bUd`YgbYk g"Wca |
| | bYk g"V`cca VYf[`Uk "Wca |

| 8YhU]`g | |
|---------|---|
| | Z]fghUa YbXa Ybh"a hgi "YXi |

6 Ygi WX Yb 'G]Y 'i bg 'Ui Z. 'a Y]b!k]Yb "bYh