H\YgY`WYfh]Z]WUh]cbg`gYfjY`Ug`hfi ghYX`g\cfhW'hg`]b`Wca d`YI g\cdd]b[Ybj]fcba YbhgžU``ck]b[Wcbgi a Yfg hc U`][b h\Y]f

Yh\]WU``qhUbXUfXq"

Bc[·]UXXfYgg[·]cf[·][·]cWUh]cb[·]Uj[·]UV[·]Y["]! [·] [↓] [↓] [↓] ^b [·]hcXUmg[·]fUd]X[·]m Yjc`j]b[a Uf_Yhd`UWYžWcbgi a Yfg'UfY'VYWca]b[a cfY'Uhhi bYX'hc h\Y`Yh\]Wg`VY\]bX`h\Y]f`di fW\UgYg"`H\]g`g\]Zh`]g`bch`'i gh'UVci h k\Uhh\YmVimžVih\ck dfcXiWhgUfY a UXYžUgh\Ym]bWfYUg]b[`m gYY_`ci h`hUb[]V`Y`gc`i h]cbg`hc`dfYgg]b[`[`cVU``]ggi Yg``]_Y`W]a UhY WXUb[YžV]cX]jYfg]hm`cggžUbX`gcW]U``]bYeiU`]hm"`5WWcfX]b[`hc` YIdc_bYk g"Wca žgi ghU]bUV]`]hmWYfh]Z]WUh]cbg`\Uj Y Ya Yf[YX Ug _Ym'd`UmYfg`]b`[i]X]b['Wcbgi a Yf'W\c]WYgž'dfcj]X]b['Wf]h]WU` jU`]XUh]cb h\UhdfcXi Whg a YYh gdYW]Z]WYbj]fcba YbhU`ž gcW]U`ž UbX



8]gWcjYf\ck_gighU]bUV]`]hmWYfh]Z]WUh]cbgg\UdYWcbgiaYf Wkc]Wfg'UbX']bZiYbWf'Vig]bYggYg']b'h\Y]f'^cifbYm'hckUfX fYqdcbq]V`Y'dfUWh]WYq"

GighU]bUV]`]hm'7Yfh]Z]WUh]cbg.'H\Y'?Ym'hc Ga UfhYf G\cdd]b[7\c]Wg

7Yfh]Z]WUh]cbg.5 Hfi ghk cfh\m7ca dUgg

hYWXbc`c[]Yg"

H\Y'h\]fX'ghU[Y']bj c`j Yg'XYg][b]b['gi ghU]bUV`Y'dfcXi Whgž'U`gc _bck b'Ug'YWcXYg][b"'K]h\'Wcbgi a Yfg']bWfYUg]b[`m'ZUj cf]b[[fYYb'dfcXi Whgž'Vi g]bYggYg'h\Uh'Ya VfUWF'YWcXYg][b'WUb'WUfj Y ci h'Wca dYh]h]j Y'UXj UbhU[Yg"'H\Y'Zci fh\'ghU[Y'YbWci fU[Yg'h\Y YI d`cfUh]cb'cZ'bYk 'Vi g]bYgg'a cXY`gž'k \]`Y'h\Y'Z]bU``ghU[Y]bj c`j Yg'WfYUh]b['Wc``UVcfUh]j Y'd`UhZcfa g'hc'UXXfYgg'k UghY'UbX fYgci fWF'a UbU[Ya Ybh'W\U``Yb[Yg'Vm`Yj YfU[]b['a cXYfb

dfcWYgg"

H\Y`gYWcbX`ghU[Y`YI hYbXg`h\Y`gi ghU]bUV]`]hm`ZcWi g`hc`h\Y`Ybh]fY gi dd`m`W\U]bž`dfca dh]b[`Wca dUb]Yg`hc`UXcdh`U`dfcUWh]j Y UddfcUW\`h\Uh`]bhY[fUhYg`YWcbca]Wž`ei U`]hmž`UbX`Ybj]fcba YbhU` Wf]hYf]U"`=a d`Ya Ybh]b[`U`@]ZY`7mWY`5bU`mg]g`WJb``YUX`hc g][b]Z]WJbh`Wcgh`gUj]b[g`UbX`VYhhYf`fYgci fWY`a UbU[Ya Ybh" A YUbk \]`Yž`U[f]Wi`hi fUk]_]"Wca `bchYg`h\Uh`WYfh]Z]WJh]cbg``]_Y : G7`Ybgi fY`fYgdcbg]V`Y`a UhYf]U`g`a UbU[Ya Ybh`h\fci [\ci h`h\]g

6i g]bYggYgʻhmd]WU``m`dfc[fYggʻh\fci[\`Z]jY`ghU[Ygʻcbʻh\Y]f`dUh\ hcʻgi ghU]bUV`Y`dfUWh]WYgžYUWX`dfYgYbh]b[`i b]eiY`WXU``Yb[YgʻUbX cddcfhi b]h]Yg"`GhUfh]b[`k]h\`Wca d`]UbWY`UgʻUbʻcddcfhi b]hmž Wca dUb]Ygʻa i ghʻZ]fghʻUX\YfY`hc`YI]gh]b[`Ybj]fcba YbhU` fY[i`Uh]cbg"`H\]gʻWca d`]UbWY`WUb``YUX`hc`]bbcj Uh]jY`dfUWh]WYgž gi ddcfhYX`Vm`WYfh]Z]WUh]cbgʻgi WX`Ugʻ€C`%(\$\$%`UbX`9A 5Gž'k \]WX \Y`d`Z]fa gʻa UbU[Y`h\Y]f`Ybj]fcba YbhU``]a dUWhgʻYZZ]W]Ybh`m"

$H \setminus Y \simeq i fbYm hc Gi ghU]bUV]$)hm

dfYgYbWY"

di fWX UgYg'k]h\ 'h\Y]f'dYfgcbU``j U`i Yg"'7cbgi a Yfg'UfY'k]``]b['hc dUm'U'dfYa]i a 'Zcf'WYfh]Z]YX'dfcXi Whgž'dYfWY]j]b['UXXYX'j U`i Y']b \YU`h\ 'UbX'Yh\]WU``Wcbg]XYfUh]cbg"'H\]g'XYa UbX'bch'cb`m'VYbYZ]hg fYgdcbg]V`Y'Wca dUb]Yg'Vi h'U`gc'YbWci fU[Yg'h\Y'Ybh]fY']bXi ghfm hc'Y`Yj UhY']hg'ghUbXUfXg"'<ck Yj Yfž'Ug'gi ghUbh"Yg'X]gW ggYgž Vi g]bYggYg'UfY'cb'U''ci fbYm'hck UfX'gi ghU]bUV]`]hm'k \]W\']bj c`j Yg gYj YfU`'XYj Y`cda YbhU`'ghU[Yg'h\Uh'g\UdY'h\Y]f'`cb[!hYfa 'a Uf_Yh

8 Y hU]`g	
Cfh	Bc'UXXfYgg'cf``cWUh]cb'UjU]`UV`Y"
EiY``Yb	● k k k "YI dc_bYk g"Wca
	• gi ghUbh"Yg

5gʻh\Y``UbXgWUdY`cZ'Wcbgi a Yf`W\c]WYg`Wcbh]bi Ygʻhc`g\]Zhž gi ghU]bUV]`]hm`WYfh]Z]WUh]cbg`k]```]bWfYUg]b[`m`gYfj Y`Ugʻj]hU``hcc`g Zcf`ZcghYf]b[`fYgdcbg]V`Y`Wcbgi a dh]cb"`6m`gi ddcfh]b[`WYfh]Z]YX dfcXi Whgž`Wcbgi a Yfgʻbch`cb`m`fYk UfX`WcbgW]Ybh]ci gʻVi g]bYggYg Vi h`U`gc`gh]a i `UhY`h\Y`k \c`Y`]bXi ghfm`hc`UXcdh`VYhhYf`dfUWh]VYg" =h g`WYUf`h\Uh`Ub`]bZcfa YX`di fW\UgY`hcXUm`]g`U`a][\hm`ghYd hck UfX`U`a cfY`gi ghU]bUV`Y`hca cffck "

`Yj Y`g"

H\Y:cfYgh'GhYk UfXg\]d'7ci bW]`fl G7Ł'WYfh]Z]WUh]cb`]g'Yei U``m Wf]h]WU``Ug`]h`[i UfUbhYYg'h\Uh'k ccX'dfcXi Whg'Wca Y'Zfca fYgdcbg]V`m'a UbU[YX'ZcfYghg"'H\]g'\Y`dg'dfca chY'V]cX]j Yfg]hmž k cf_Yfg `f][\hgž'UbX'hfUbgdUfYbWm'h\fci [\ci h'h\Y'gi dd`m'W\U]b" @Ugh`mž'9A 5G`cZZYfg'U'ZfUa Yk cf_'Zcf'cf[Ub]nUh]cbg'hc'Yb\UbW h\Y]f'Ybj]fcba YbhU``dYfZcfa UbWY'UbX'Ybgi fY'fY[i `Uhcfm Wca d`]UbWY'k \]`Y'YbWci fU[]b['Ya d`cmYY'Yb[U[Ya Ybh'Uh'U``

gdUWYg"

5bch\Yf`g][b]Z]WUbh`WYfh]Z]WUh]cb`]g`@998žk\]W\`ZcW'gYg`cb gighU]bUV`Y`Vi]`X]b[`XYg][b"`=h`YjU`iUhYg`YbYf[m`YZZ]W]YbWhž a UhYf]U``igU[Yž`UbX`cjYfU``Ybj]fcbaYbhU``eiU`]hmž`aU_]b[`]h`U j]hU``UggYh`Zcf`WcbghfiWh]cb`WcadUb]Yg``cc_]b[`hc`Yb\UbWY`h\Y]f a Uf_Yh`UddYU``k\]`Y`ZcghYf]b[`\YU`h\]Yf``]j]b[`UbX`kcf_]b[

H\Y'XYa UbX'Zcf`gi ghU]bUV]`]hm'WYfh]Z]WUh]cbg`]g'Yj]XYbWY'cZ'U [fck]b['UkUfYbYgg'cZ'Ybj]fcbaYbhU``]ggi Yg"'H\YgY'WYfh]Z]WUh]cbg]adfcjY'WcfdcfUhY'fYdi hUh]cbgž'cdYb'UjYbi Yg'hc'bYk 'aUf_Yhgž UbX'Yb\UbWY'cdYfUh]cbU``YZZ]W]YbW]Yg"': cf`]bghUbWYž'=GC'%(\$\$%ž fYWc[b]nYX'[`cVU``mž'gYhg'ghf]b[Ybh'fYei]fYaYbhg'Zcf Ybj]fcbaYbhU``aUbU[YaYbh'gmghYagž'YbUV`]b['Vig]bYggYg'hc]XYbh]Zm'UbX'a]h][UhY'h\Y]f'Ybj]fcbaYbhU``]adUWhg'YZZYWh]jY`m" • U[f]W/ `hi fUk]_]"Wca

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