i X[Y'Hi hYf'xc]bg'7cbfUX / Ua d / GWX YfYf. 5 B Yk '7 \ Ud hYf'Zcf'6fck UfX '@Uk



: cfh'@Ui XYfXU`Yž: `cf]XUž'I G5 !! ₺ 'U'g][b]Z]WUbh'a cj Y'k]h\]b
h\Y: `cf]XU``Y[U``Wca a i b]hmž'fYh]fYX'6fck UfX'7\]YZ'¾ X[Y'¾UW_
Hi hYf']g'ghYdd]b[']bhc'U'bYk 'fc`Y'Ug'U'gYb]cf'dUfhbYf'Uh'7cbfUX'/
GWXYfYf'Hf]U``@Uk mYfg"'H\]g'hfUbg]h]cb'a Uf_g'bch'¼ gh'U'dYfgcbU`
a]`YghcbY'Zcf'Hi hYf'Vi h'U`gc'U'ghfUhY[]WYb\UbWa Ybh'Zcf'h\Y
Z]fa ž'k \]WX'\Ug'a UXY'\YUX`]bYg'Zcf']hg'\][\!dfcZ]`Y'`]h][Uh]cb
gi WWYggYg"

 $\label{thm:limit} Hi \ hYf g`]``i \ ghf]ci \ g`WUfYYf`gdUbg`bYUf`m`()`mYUfgž`\Uj]b[`VYYbUddc]bhYX`Ug`U`^t X[Y`]b`&$$)`Vm`Zcfa Yf`; cj Yfbcf`*\V`6i g\\"`<YYUfbYX`fY!Y`YWh]cb`a i`h]d`Y`h]a Ygž`gc`]X]Zm]b[`\]g`]bZi YbWY`]b`h\Y\\+\\\\\\X]W]U``7]fW']hž`k\YfY`\Y`gYfj YX`Ug`7\]YZ'\\X[Y`Zcf`Y][\h\mYUfg\"`<]g``YUXYfg\]d`k Ug`YgdYW]U``m`bchUV`Y`Xi f]b[`W\U``Yb[]b[$

 $\label{thm:composition} $$Yj Ybhg``]_Y'h\Y'7CJ=&!%-'dUbXYa]WUbX'h\Y'DUf_`UbX'g\cch]b[$$hf]U`"'FYZYWh]b['cb'\]g'WUfYYfž'Hi hYf'YI dfYggYX'h\Uh']h'k Ug'Ub\\cbcf'hc'gYfj Y': `cf]XU'UbX'6fck UfX'7ci bhm'Zcf'&$'mYUfgž'ghUh]b[$$h\Uh'^c]b]b['7cbfUX'/'GWXYfYf'k Ug'U'bUhi fU`'WXc]WYž'Ug']h'k Ug'h\Ycb`m``Uk'Z]fa '\Y'Wcbg]XYfYX"$$$

5 BYk 7\UdhYfUh7cbfUX/ GWXYfYf

 $\label{thm:charge} $$7 \cbfUX'/ GWXYfYf]g'bc'ghfUb[Yf'hc'h\Y'gdch`][\h'':H\Y'Z]fa\ \check{z}$$ fcchYX']b': cfh'@Ui XYfXU`Y'k]h\'UXX]h]cbU``cZZ]WYg']b':6fYj UfX\check{z}$$ Bcfh\'7 Ufc`]bUž'UbX'Yj Yb'Ei]hcž'9W' UXcfž'gdYW]U`]nYg']b':Wca d`YI `]h][Uh]cb'':H\Ym'fYWYbh`m'UWX]Yj YX'U'ghU[[Yf]b['`,'&'a]``]cb''^1 fm j YfX]Wh'U[U]bgh'K Y``g': Uf[c'Zcf'h\Y'GYa]bc`Y'Hf]VY'A]bcfg':Hfi ghžk\]WX'\][\`][\hg'h\Y]f':WUdUV]`]hm']b':bUj][Uh]b['Wca d`YI'`Y[U`k UhYfg'':Hi hYf'k]``bch'cb`m'Vf]b['\]g':Wcbg]XYfUV`Y'hf]U`'YI dYf]YbW'hc'h\]g':fc`Y'Vi h'U`gc'Yb[U[Y']b':UfV]hfUh]cb':UbX'YI dYfh'k]hbYgg k cf_''$

K \m'=h'A UhhYfg

H\Y`Uddc]bha YbhcZ`U`Z][ifY``]_Y`HihYf`hc`U`Z]fa `fYbck bYX`ZcfhUW_`]b[`\][\!YbX``Y[U``W\U``Yb[Yg`gi[[Yghg`U`fcVigh`ZihifY`Zcf7cbfUX'/`GW\YfYf"'<]g`YIdYfh]gY`]b`\][\!dfcZ]`Y`Vig]bYggX]gdihYgž`Y`YWh]cb`W\U``Yb[Ygž`UbX`hcfh``]h][Uh]cb`k]```gYfjY`h\YZ]fa `kY```Ug`h\Ym`Wcbh]biY`hc`dig\`h\Y`YbjY`cdY`]b``Y[U`UXjcWUWh"

cf`h\cgY`Ugd]f]b[`hc`Zc``ck`]b`Hi hYfg`ZcchghYdgž'h\Y`^ci fbYm`hc VYWca]b[`U``Uk mYf`]b`: `cf]XU`XYa UbXg`U`V`YbX`cZ'X]`][Ybh dfYdUfUh]cb'UbX'fYg]`]YbW'"'FYei]g]hY'ghYdg']bWiXY'YUfb]b['UVUWXY`cfg'XY[fYYž'dUgg]b['h\Y'@Uk'GWXcc``5Xa]gg]cb'HYghf@G5HŁž'cVhU]b]b['U'¾f]g'8cWhcf'fb'8"Ł'Zfca'Ub'565!UVWfYX]hYX`Uk'gWXcc`ž'UbX'giWW'ggZi``m'bUj][Uh]b['h\Y':`cf]XU'6Uf'9!Uažk]h\'U'gc`]X'UjYfU[Y'gU`Ufm'Zcf'`Uk mYfg']b'h\Y'ghUhY'fYUWX]b[UfcibX'`%')ž(\$"

K]h\`U`dfc^YWhYX`^cV`[fck h\`cZ'-i `Zcf``Uk mYfg`]b`: `cf]XUž'Hi hYf g bYk `fc`Y`YI Ya d`]Z]Yg`\ck `cbY`WUb`hfUbg]h]cb`Zfca `^i X]W]U`Ui h\cf]hm`hc`U`d]j chU``dcg]h]cb`]b`df]j UhY`dfUWh]WY"`K \Yh\Yf`mci U]a `hc`UgWYbX`h\Y`^i X]W]U``fUb_g`cf`h\f]j Y`]b`U``Y[U``Z]fa ž`fU]g]b[cbY g`\UbX`hc`hU_Y`cb`Wca d`YI`WUgYg`UbX`fYgdcbg]V]`]h]Yg`dfcj Yg hc`VY`U`k Y``!hfcXXYb`dUh\`hck UfX`qi WWYgg"

#b 'gi a a Ufmž'Hi hYf g 'bYk 'W\UdhYf'bch'cb`m'Yb\UbW'g'7cbfUX'/
GW\YfYf g 'dcg]h]cb ']b 'h\Y '`Y[U```UbXg\UdY'Vi h'U`gc 'gYfj Yg'hc
]bgd]fY 'h\Y 'bYI h'[YbYfUh]cb 'cZ': `cf]XU``Uk mYfg'hc 'ghf]j Y 'Zcf
YI WY``Yb\W' 'UbX']bhY[f]hm']b 'h\Y]f'\WJfYYfg"

: cf'Zi fh\Yf'XYhU]`gž'fYZYf'hc': `cf]XU'Dc`]h]Wgž'7cbfUX'/ 'GWXYfYf ž'UbX'Y@Uk HU`_"

| 8 YhU]`g | |
|----------|---|
| Cfh | :cfh'@UiXYfXU`Yž':`cf]XUž'lG5 |
| EiY``Yb | Z`cf]XUdc`]h]Wg"Wca |
| | kkk"WcbfUXgW\YfYf"Wca |
| | Y`Uk hU`_"Wca |

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