

MMAN1130

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7 ci fgY⁻Cj Yfj]Yk

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ΚΥν

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<u>IBGK 'Ghi Xm5VfcUX'UbX'9I WkUb[Y</u>'fZcf']bVci bX'ghi XYbhgŁ

<u>IBGK : ihifY'GhiXYbhg</u>

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fŽ*%`&Ł`-',)`+**%`**-**'9b[]bYYf]b[`**±**Xi glf]U``HfU]b]b[

fŽ*%`&Ł'-',)`'%+-`<mark>-</mark>`IBGK`GhiXm5VfcUX`UbX`IBGK`9IW\Ub[Y`fZcf`]bVcibX`ghiXYbhgŁ

 $f\tilde{Z} * \% \& E'-',) (\$-+-GWX cc`CZ]WH H$

łłD`YUgY`bchY`h\Uhih\Y`GW\cc``CZ]WY`k]``bch_bck `k\Yb#Zmcif`WcifgY`WcbjYbcf`]g`cb`WJadig`cf UjU]`UV`Y

7cifgY[·]8YHJ]`g

7 fYX]hDc]bhg`*`

Gi a a UfmcZh\Y'7ci fgY

<UjY`mci `YjYf`Wcbg]XYfYX`\ck`kY`aU_Y`XYj]WYg`UbX`aUVX]bYg3`KcbXYfYX`\ck`U`WUf`Yb[]bY`kUg`aUXY

UbX'Uddfcdf]UHY`mZfca 'h\YgY'g]Hyg"

b WUgg. H\YfY UfY h\fYY]b! WUgg UWjj]h]Yg]b U hmd]WU k YY_k \]Wk k Y fYZYf hc Ug h\Y @YWi fYž Hi hcf]U UbX 7 58 #7 5A @UV VUgYX cb h\Y h]a YhUV Y]b GYWjcb " "H\Y cb]bY gY[a Ybhg cZh\]g Wci fgY UfY cf[Ub]gYX cb h\Y Zc ``ck]b[df]bW]d Yg.

- %" @YUfb]b[.:Ghi XYbh`YUfb]b[`]g'h,Y'Zjfghdf]cf]hm!'hYUW,]b[`UbX`UggYgga YbhUfY`gYWcbXUfm WcbWYfbg"'@YUfb]b[`\YfY`]g`XYZjbYX`Ug`[U]b]b[`bYk `k Umg`cZi bXYfghUbX]b[`'h,Y'Z]Y`X`cZXYg][b`UbX a Ubi ZUWfi f]b[`]b`a YW,Ub]WU``Yb[]bYYf]b[/bchUg`g]a d`ma Ya cf]g]b[`]bZcfa Uh]cb"`K Y`UfY`hfm]b[`'hc hfUbgZcfa `mci `]bhc`Yb[]bYYfg`UbX`Wf]h]WU``h,]b_Yfg`]b'h,Y'X]gW]d`]bY"
- &" DYYf`=bhYfUWh]cb.`@YUfb]b[`]g`U`gcW]U``UWh]j]mržUbX`fYgYUfW\`g\ckg`h\Uhmci`k]```YUfb`acghUbX VYghk\Yb`mci`UfY`UWh]jY`mhUi[\hVmmcifdYYfg`UbXž]b`hifbž`k\Yb`mci`hYUW\`h\Ya"
- ' " **5i ħ Ybh]Ŵ]m** ːK Yːk]```\Uj YːUgʻa i W. ʿUi ħ Ybh]Ŵ]mːcZYb[]bYYf]b[ˈdfUŴ]W/ ʿUgʻ]gʻdcgg]V`Yːk]ħ]bˈħ Y WebghfU]bhgʻcZħ YːWei fgYʿUbXːk \YfY`]hXcYgʻbchfYghfU]bˈmci f¨YUfb]b["
- (" <][\`ghUbXUfXg.`K Y`k]```\Uj Y`\][\`ghUbXUfXg`Zcf`UWX]Yj Ya Ybh]b`h\Y`Wci fgYž'UbX`Yj YfmcbY f]bWi X]b[`ghUZŁ`k]```VY`UWWci bhUV`Y`Zcf`di h]b[`]b`h\Y`YZcfhhc`[Yhmci `hc`h\Y`ghUbXUfX"
-) "CdYbbYgg. 5gʻa i W. Ugʻdcgg]VYžih.]gʻWci fgYik]``VYʻWcbXi WhYX`]bih.YicdYbik \YfY`U```dUfh]WjdUbhg WUbʻVY`Uk UfYicZ]hUbX`Wca a Ybhi dcbi]h
- *" **DfcWygg**. 'H\Y`ZcŴgcZh\Y`WcifgY`k]``VY`cb`dfcWyggYgžbchcihWcaYg"`H\Y`f][\hciHWcaYg`k]``VY U`VmldfcXiWicZZc``ck]b[`h\Y`WcffYWidfcWyggYg"

H\Y`YWi fYg`]b`h\]g`Wci fgY`k]```Wcj Yf`WcfY`WcbWYdhg`UbX`VUW_[fci bX`h\Ycfm`]b`a Ubi ZUWi f]b[`UbX Yb[]bYYf]b[`XYg][b"`H\Y``YWi fY`a UhYf]U``]g`Uj U]`UV`Y`hc`ghi XYbhg`Y`YWfcb]WU``mVYZcfY`YUW\`WUgg`j]U HYUa g"

H\Y`Hihcf]U`g`k]```dfcj]XY`]adcfHUbhWcbHYIHiU`]gUH]cb`VYHkYYb`H\Y`dfUWH]WU``g_]``g`VY]b[``HUi[\h]b`H\Y``UVgž H\Y`WcbWYdhg`VY]b[`]bHcXiWYX`]b`H\Y``YWhifYg`UbX`\][\`][\h\ck`H\YgY`UfY`fY`UHYX`k\Yb`XYg][b]b[`UbX aUbiZJWhif]b[`]b`H\Y`fYU``kcfX"

5XX]h]cbU`7cifgY = bZcfaUh]cb

H\]g`]g`U`*`i b]HcZWfYX]hfl_c7EWci fgY`UbX`]bj_c`j Yg`*`\ci fg`dYf`k YY_`f_#_EcZgWXYXi `YX`cb`]bY`WcbHUWf

H\Y`bcfa U``kcf_`cUX`YIdYWUHjcbg`cZU`ghi XYbh'UfY`UddfcI]a UHY`mi&)`\cifg`dYf`HYfa `Zcf`YUW\`IC7ž]bWi X]b[`WUgg`WcbHUWh`\cifgž`cH\Yf``YUfb]b[`UWHjj]h]Ygž`dfYdUfUHjcb`UbX`Hja Y`gdYbhicb`U```UggYggUV`Y kcf_"

Mci 'g\ci `X`U]a 'hc`gdYbX`UVci h%&`\#k 'cb`h\]g`Wci fgY"`H\Y`UXX]h]cbU``h]a Y`g\ci `X`VY`gdYbh]b`a U_]b[gi fY`h\Uhmci `i bXYfgHUbX`h\Y``YWh fY`a UhYf]U`ž`Wca d`Yh]b[`h\Y`gYhUgg][ba Ybhgž'Z fh\Yf`fYUX]b[ž'UbX fYj]g]b[`Zcf`UbmYI Ua]bUh]cbg"

5ggYgga Ybh

8YHJ]`YX`]bZcfa UH]cb`cb`U```UggYgga Ybhg`]g`Uj`U\`Y`H\fci [\`HYUa g"

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5ggYgga YbhHJg_	K Y][\h	8iY'8UHY	GhiXYbhï@YUfb]b[CihWcaYgʻ5ggYggYX
7 ca di hYf!U]XYX`8Yg][b G_]``g`	(\$1	K_YY_`(`:f]XUm#K_YY_`+ :f]XUm	(Ž) Ž * Ž +
7B7AUWX]b]b[5ggYggaYbh	&) ı	:]`Y`Gi Va]gg]cb`!`K YY_`, ž HYgh]b[`!`9I Ua `DYf]cX	' Ž(Ž)Ž*
5gg][ba Ybh	')	K YY_`%\$`!`: f]XUm	%ž' &ž' * Ž' +

5ggYgga Ybh8YHJ]`g

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GHUfhXUhY. Bch5dd`]WUVY

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HYgh]b['Wca di hYf!U]XYX'XYg][b'g_]``g'Wcj Yf]b['Yb[]bYYf]b['XfUk]b[gžWca di hYf!U]XYX'XYg][b'UbX Wca di hYf!U]XYX'a Ubi ZUWi fY"'

5XX]h]cbU``XYHJ]`g.

&1`&\$i``hYghg"`HYgh%`UbX`&`k`]```VY`\Y`X`]b`K`YY_g`(`UbX`+`Xif]b[`'h\Y`:f]XUm`YWhifYžfYgdYWhjjY`m"`:]`Yg``` k`YY_ aighVY`giVa]hhYX`hc`AccX`Y`Ug`dYf`]bghfiWhjcbg`]b`h\Y`hYghidUdYf"`AUf_g`UfY`hc`VY`fYhifbYX`k]h\]b`hkc k`YY_g`cZh\Y`hYgh"

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$GHUfhXUhY. BNdho5tddA}/Mp/pfiicable$

8 YHJ]`g.

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5XX]h]cbU``XYhJ]`g.

@Yb[h\.'I d'hc'&\$'dU[Yg

8YHJ]`g.

7 UgY`ghi X]Yg`UbX`[i]XYX`ei Ygh]cbg`UVci hth.Y``]b_`VYhk YYb`XYg][b`UbX`a Ubi ZUWi fY"

5XX]h]cbU``XYhJ]`g.

Gi Va]gg]cb'hc'Hi fb]h]b'Vcl `]b'A ccX'Y'Ug'dYf'UggYgga Ybh[i]XY`]bYg"'A Uf_g'hc'VY'fYhi fbYX'i dcb'fY'YUgY cZZ]bU``a Uf_g"

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FYWca a YbXYX FYgci fWYg

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7ci fgY'9j U`i Uh]cb'UbX'8Yj Y`cda Ybh

: YYXVUW_cbihY'WcifgY']g`[UhYfYX'dYf]cX]WU``mig]b['jUf]cig`aYUbgž]bWiX]b['hY'IBGK a m9IdYf]YbW'dfcWYggž]bZcfaU``X]gW gg]cbi]b'hY'Z]bU`'WUgg'Zcf'hY'WcifgYžUbX'hY'GW.cc''g GhiXYbh#GhUZZaYYh]b[g"'Mcif'ZYYXVUW_']g'hU_Yb'gYf]cig`mžUbX'Wcbh]biU``]adfcjYaYbhg'UfY'aUXY'hc'h\Y WcifgY'VUgYXž]b'dUfhžcb'giW.'ZYXVUW_''

⊕ ih]g Wci fgYž fYW bh]a dfcj Ya Ybłg iYgi `h]b['Z̄ca 'gh XYbhZYYXVUW_']bWi XY fYXYg][b]b['a Uf_]b['Wf]hYf]U
 Zcf 7 58 'WUggYg']b gi W. 'U'k Umh\UhZcW gYg cb'dfcW/gg fUh\Yf 'h\Ub'ci h\carcel{equations}
 Y' @YWi fY WcbhYbh\Ug VYYb
 fYU`][bYX 'hc 'Ybgi fY fY`Yj UbW 'hc 'UggYgga Ybh' DYfgcbU` Yb[fUj]b[g'UfY bck ']a d`Ya YbhYX Zcf 'h\Y '7 B 7
 a UW\]b]b['UggYgga Ybh'

UggYgga YbhidYfZcfa UbWYžmci 'UfY'Y`][]V`Y`hc'Udd`m'Zcf`GdYWJU``7cbg]XYfUhJcb'df]cf`hc`gi Va]hhJb['Ub UggYgga Ybhicf`g]hhJb['Ub'YI Ua "

IBGK 'bck '\Ug'U'<u>|hhc'G]h#GiVa]hfi Y</u>žk\]W\'aYUbg'h\Uh]Zmci 'UhhYadhUb'YIUa 'cf'giVa]hU'd]YWY'cZ UggYggaYbhžmci 'UfY'XYWUf]b['mci fgY`ZZ]hYbci [\'hc'Xc'gc'UbX'WUbbch`UhYf'Udd`mZcf'GdYW]U` 7 cbg]XYfUh]cb"

: cf`XYHJ]`g`cZUdd`m]b['Zcf`GdYW]U``7 cbg]XYfUH]cb`UbX`WcbX]H]cbg`Zcf`H\Y`Uk UfX`cZgi dd`Ya YbHUfm UggYgga Ybhž'd`YUgY`gYY`H\Y`]bZcfa UH]cb`cb`L BGK **'**g`<u>GdYW]U``7 cbg]XYfUH]cb`dU[Y</u>"

D`YUgY'bchY'h\Uhigh XYbhg'k]``bch'VY'fYei]fYX'hc'dfcj]XY'UbmXcW'a YbhUfm'Yj]XYbW'hc gi ddcfh'UVgYbW'g'Zfca 'Ubm'WUggYg'a]ggYX'VYWUi gY'cZ'7CJ=8!% 'di V`]W\YU'h\'a YUgi fYg'gi W\'Ug]gc`Uh]cb"'I BGK 'k]``bch'VY']bg]gh]b['cb'a YX]WU`'W'fh]Z]WUh'g'Zfca 'UbmcbY'XYYa YX'hc'VY'U'dcg]h]j Y'WUgYź cf'k\Yb'h\Ym'\Uj Y'fYWcj YfYX"'Gi W\'W'fh]Z]WUh'g'UfY'X]Z]W'hhc'cVhU]b'UbX'di hUb'i bbYW'ggUfmghfU]b'cb gh XYbhg'UbX'a YX]WU`'ghUZ''

5dd`]WUhjcbg'Zcf'gdYWjU`'Wcbg]XYfUhjcb'k]``VY'fYei]fYX'Zcf'UggYggaYbh'UbX'dUfhjWjdUhjcb'UVgYbWYg'-Vi hbc'XcW a YbhUfmYj]XYbWY'Zcf'7CJ=8'% ']``bYgg'cf']gc`Uhjcb'k]``VY'fYei]fYX"

5WUXYa]W<cbYghmUbX D`U[]Uf]ga

IBGK `\Ug`Ub`cb[c]b[`Wcaa]haYbhhc`ZcghYf]b[`U`W`h fY`cZ`YUfb]b[`]bZcfaYX`VmUWUXYa]W]bhY[f]hm`'5`` IBGK `ghiXYbhg`\UjY`U`fYgdcbg]V]`]hmhc`UX\YfY`hc`h\]g`df]bW]d`Y`cZUWUXYa]W]bhY[f]hm`'D`U[]Uf]ga ibXYfa]bYg`UWUXYa]W]bhY[f]hm`UbX`]g`bchhc`YfUhYX`UhIBGK "`B'SY[Sde_SfG@EI[eVW{`WVSege[`Y fZWiadVead[VWSeaXafZWdeS`V bSee[`YfZW_aXSekagdai`ž

D`U[]Uf]ga `]g`U`hmdY`cZ]bhY``YWi U``h\YZh" =iWUb`hU_Y`a UbmZcfa gžZfca `XY`]VYfUhY`W\YUh]b[``rc`UVW]XYbhU``m Wcdm]b[`Zfca `U`gci fWY`k]h\ci hUW_bck `YX[Ya Ybh'`I BGK `\Ug`dfcXi WYX`U`k YVg]hY`k]h\`U`k YU`h\`cZ fYgci fWYg`rc`gi ddcfhighi XYbhg`rc`i bXYfghUbX`UbX`Uj c]X`d`U[]Uf]ga žij]g]h`ghi XYbh'i bgk "YXi "Ui #d`U[]Uf]ga " H\Y`@YUfb]b[`7YbhfY`Ugg]ghg`ghi XYbhg`k]h\`i bXYfghUbX]b[`UWUXYa]W]bhY[f]hmUbX`\ck`bchhc`d`U[]Uf]gY" H\YmU`gc`\c`X`k cf_g\cdg`UbX`Wb`\Y`d`ghi XYbhg`cbY!cb!cbY"

 Mci 'UfY'U'gc'fYa]bXYX'h\UhWUfYZ ``h]a Y'a UbU[Ya Ybh']g'Ub']a dcftUbhdUfhcZgh XmUbX'cbY'cZh\Y

]XYbh]ZYX'WUi gYg'cZd`U[]Uf]ga ']g'dccf'h]a Y'a UbU[Ya Ybh'Gh XYbhg'g\ci `X'U``ck 'gi ZJW]Ybh'h]a Y'Zcf

 bXYfa]bYYk cfXYbhg'g\`A 'gWcZX'U\`DWYWUi #cbgH

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5₩UXYa]W=bZcfaUh]cb

7 fYX]hdc]bhg

7 ci fgY`WYX]hi]g`WU`W``UhYX`]b`I b]hg!CZ7fYX]hfI C7Ł"`H\Y`bcfa U``kcf_`cUX`YI dYWUh]cb`Zcf`cbY`I C7

- <u>A ccX`Y</u>
- <u>@UV`5\WW¥gg</u> <u>7 ca di hjb[∵ UW¥]hj¥g</u>

5ddYbX]I. '9b[]bYYfg'5ighfU`]U'f95E'DfcZYgg]cbU`'9b[]bYYf'7cadYhYbWm GHJbXUfX

Dfc[fUa ⁺=bHYbXYX`@YUfb]b[℃iHWcaYg	
?bck`YX[Y'UbX'g_]``VUgY	
D9%"%7cadfY\Ybg]jYžh\YcfmVUgYX`ibXYfgHJbX]b[`cZh\Y`ibXYfd]bb]b[`bUhifU``UbX d\mg]WJ``gW]YbWYg`UbX`h\Y`Yb[]bYYf]b[`ZibXUaYbHJ`g`Udd`]WJV`Y`hc`h\Y`Yb[]bYYf]b[`X]gW]d`]bY	
D9%"&`7cbWYdhiU``ibXYfghUbX]b[`cZh\Y`aUh\YaUh]WgžbiaYf]WU``UbU`mg]gžghUh]gh]WgžUbX WcadihYf`UbX`]bZcfaUh]cb`gW]YbWYg`k\]W\`ibXYfd]b`h\Y`Yb[]bYYf]b[`X]gW]d`]bY	
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D9%") "? bck `YX[Y`cZYb[]bYYf]b[`XYg][b`dfUWf]WY`UbX`WcbhYIhiU``ZUWrcfg`]a dUWf]b[`h\Y Yb[]bYYf]b[`X]gW]d`]bY	
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9b[]bYYf]b[`Udd`]WUh]cb`UV]`]m	