

Gma dhca Y'XYf'< Ò\Yb_fUb_\Y]h'i bX'k]Y a Ub'g]Y'j Yfa Y]XYh

⇒ b[ž'Z]h'i bX'[Ygi bX'ni 'gY]b'VYXYi hYh'b]W\hž'XUgg'G]Y'b]W\h'Ub
Gma dhca Yb'XYf'<Ò\Yb_fUb_\Y]h'`Y]XYb"'Gc'Yf_YbbYbž'VY\UbXY`b
i bX'j Yf\]bXYfb'G]Y'g]Y'YZZY_h]j
</p>

; $fUW]Y]gh Ghi XYbh]b Ub XYf <math>\infty bg < cd_]bg I b]j Yfg]hm ZX]Y Y]b Yg XYf VYghYb a YX]n]b]gW Yb 5i gV] Xi b[gdfc[fUa a Y XYf K Y h Ub V]YhYh" G]Y]gh gW `Ub _ Z Z]h i b X U _ h]j " `G]Y fUi W h b]W h Z hf]b _ h gY h Yb i b X UW h Yh]a a Yf XUfUi Z k Ug g]Y]ggh"$

 $G]Y ``AhhY `X]Y ``YhnhY `DYfgcb `]b `i bgYfYf'; fi ddY `gY]b `gc ``Ybž X]Y \\ Gma dhca Y `XYf' < O`\Yb_fUb_\Y]h `VY_Ua ž `i bX `XcW\ `k Uf `g]Y `XUž `a]h \\ [fc > Yb `5 i [Yb `i bX `V `UggYa '; Yg]W\ h `VY]a ': fØ\ghØW_ `bUW\ `Y]bYf i bfi \][Yb `BUW\ h'j c ``Yf' , VY `_Y]h `Ua ': i > Y `XYg `7 c hcdUl]!J i `_Ubg fl ") $$ `a Ł"$

 $9fZU\ fYbY?\ YhhYfYfk\]ggYbžXUggX]Y<O\ Yb_fUb_\Y]h'_Y]bYb$

5h`Ug'/ 6cchg`DYhYf`Ui~Z`XYa~;~]dZY``XYg`5WcbWU[i~U`Ui~Z`*"-*%`a~f&&", '+'ZhŁ

9F?9BB9BG=98=9<2<9B?F5B?<9=H

< O\Yb_fUb_\Y]h'hf]hh'Ui Zž'k Ybb'=\f'? OfdYf']b'XYf'< O\Y'b]W\h
[Ybi ['GUi YfghcZZ'Ui g'XYf'@ Zh'VY_ca a h"'9g'dUgg]Yfh'Ua
\Ai Z][ghYbž'k Ybb'A YbgW\Yb'gW\bY``'j cb'b]YXf][Yf'< O\Y'Ui Z
&"(\$\$'a 'cXYf'\O\Yf'fYhk U', "\$\$\$': i » Ł'[Y\Yb"</pre>

8]Y'GmadhcaY'hfYhYb'bcfaU`YfkY]gY'nk]gW\Yb'gYW\g'ibX'&(GhibXYb'bUW\'XYa'5iZgh]Y['UiZ'ibX'g]bX'bUW\hg'cZh'gW\`]aaYf"<]Yf']ghž'kcfUiZ'G]Y'UW\hYb'gc``hYb"

< Ài Z][Y 'Gma dhca Y 'XYf' < Ò\Yb_fUb_\Y]h

- DcWXYbXY?cdZgWXaYfnYb
- 5ddYh]hj Yf`i gh
- GWk ÀWXY[YZØ\`ž'A ØX][_Y]h'cXYf'GWk]bXY`
- . VY`_Y]hii bX'9fVfYWXYb
- A U[YbgWa YfnYb
- GWk]Yf][Yg'GWX`UZYb
- ?i fnUha][_Y]h
- 9f\\O\\hYf'\Di\`g

GWXkYfY'GmadhcaY'XYf'< O\Yb_fUb_\Y]h

8]Y'< $O\setminus Yb_fUb_\setminus Y]h'_Ubb'= fY'@ib[Y'ibX'= f'; Y\setminus]fb$ VYY]bhfÀW\h][Ybž'k Ug'gY\f'gW\k Yfk]Y[YbX']gh''= b'X]YgYa': U`` _ObbYb'Zc`[YbXY'GmadhcaY'UiZhfYhYb.

• JYfk]ffhgY]b

- G]WX 'gWX k UWX 'c XYf'gWX `AZf]['ZØ\ `Yb
- I b[YgWX]W_`]WX_Y]h'cXYf'GWXk]Yf][_Y]hYb'VY]a '; Y\Yb
- #fUh]cbU`Yg'JYf\U`hYb
- 5hYa bch]a Fi\Yni ghUbX
- 6`i VVYfbXYg; YfÀi gWX]b XYf 6fi ghVY]a 5ha Yb
- 9]b'Ub\U`hYbXYf'FY]n\i ghYb'fG]Y'_ÒbbYb'Y]bY'fcgU'cXYf
 k Y]» Y'gW\Ui a][Y': `Øgq][_Y]h'Ui g\i ghYbŁ
- 6`Ui Y'cXYf'[fUi Y'@]ddYb'cXYf':]b[YfbÀ[Y`
- 8cddY`hgY\Yb
- ?fÀa dZY

 $5h^{\circ}Ug^{\prime}$ '6cchg 'DYhYf'Ui Z'DU_]ghUbg'; cbXc[cfc'@U'DUgg'Ui Z'fi bX) ") ,) 'a 'f%, "' &' 'ZhŁ

< \dot{O} \dot{Y} \dot{D} \dot{D} \dot{D} \dot{D} \dot{D} \dot{D} \dot{D} \dot{D}

; $Y Y b G Y h Y Z Y f K Y b b G Y g W k Y f Y G madh ca Y V Y a Y f Y b Z a Øgg Y b G Y G g Z c f h U i Z Y b Y b Y X f] [Y f Y < Ò Y V Y [Y V Y b f a] b X Y g h Y b g '() $ 'a '# %") $$ Z h L i b X B c h } Z Y g i W Y b "$

BY\a Yb'G]Y']a a Yf'Ya UbXYb'a]h'i bX'`UggYb'G]Y'b]Ya U`g Ya UbXYb'a]h'gWkk YfYb'Gma dhca Yb'U``Y]bY'UVghY][Yb"

GY]Yb'G]Y'[Yk Ufbhž'XUgg'Yg'nk]gW\Yb'%&'Ghi bXYb'i bX'a Y\fYfYb HU[Yb'XUi Yfb'_Ubbž'V]g'⇒\fY'Gma dhca Y'UV_`]b[Yb"

< c`Yb`G]Y`g]W\`a Y\f`GUi Yfghc\Z\`K Ybb`G]Y`g]W\`Ui Z`Y]bYa
VYgcbXYfg`Ubgdfi W\gj c``Yb`5i \Zgh]Y[\`VY\Z]b\XYb\z\`\Uh'\=\f'; i]\XY`c\XYf
\=\fY'; fi ddY`a \O[\`]\W\Yfk\Y]gY`\Ni [\Ub[\`ni `GUi Yfghc\Z\`c\XYf`Y]b\Yf
gd\Yn]Y```Ybhk\]\W\Y`\hYb'\8 fi \W_Ua a \Yf`ni f'\6\\\Ub\X`i b[\`X\Yf</pre>

 $\label{eq:fightermodel} FYgh~;~Y\Yb~cXYf~5_h]j~]hÅhYb~Y~]bgW&fÅb_Yb~GhcddYb~G]Y~YXY~,~Vi~b[~i~bX~[~Y\Yb~G]Y~Yg~fi~\][~Ub~GU[~Yb~G]Y~$A~FY~]gY~Y~]hYf~cXYf~$A~fYf~;~fi~ddY~Y\f~]W&ž~k~]Y~G]Y~g]W&~ZØ\Yb~K~Ybb~G]Y~k~Y~]hYf~Ui~ZghY~][~Ybž~_ObbYb~$A~fY~Gma~dhca~Y~gW&k~Yfk~]Y~[~YbX~k~YfXYbž~]b~X~]YgYa~~:~U~~ObbYb~G~]Y~b~]W&h~Y~]b~ZUW&~UVk~UfhYb~~~$

$$\label{eq:heliconder} \begin{split} &Hf]b_Yb^*G]Y^*j^*]Y^*K^*UggYf.^*6^*Y]VYb^*G]Y^*mXfUh]g]Yfhz^*]bXYa^*G]Y^*j^*]Y^*\\ &: `\emptyset gg][_Y]h^*hf]b_Ybz^*UVYf^*\U^*hYb^*G]Y^*g]WX^*j^*cb^*5^*_c^*z^*Yfb^*^I^*bX^*\\ &bUh\emptyset f^*]WX^*b]WX^h^*fUi^*WXYb^*\\ \end{split}$$

 $6Y\setminus UbXY`b`G]Y`= fY`?cdZgWAaYfnYb.`G]Y`_ObbYb`fYnYdhZfY]Y AYX]_UaYbhY`k]Y`= VidfcZYb`fbXj]`žBifcZYbŁ'cXYf`DUfUWYhUac`Y]bbY\aYbž'ia`= fY`?cdZgWAaYfnYb`ni`VY\UbXY`b"`9]b][Y?`YhhYfYf'jYfkYbXYb`UiWAYX]_UaYbhY`nif`6Y\UbX`ib[`jcb,VY`_Y]hž`UVYf`X]Yg`_Ubb`X]Y`GWAkYfY`= fYg`NighUbXgjYfgWX`Y]Yfbž'gc`XUgg`Yg`bcfaU`YfkY]gY`_`Ø[Yf`]ghž`XUjcbUVnigY\Yb"$

 $6YhfUWkhYbG]YHUVYhhYb[Y[Yb<0)Yb_fUb_\Y]hG]b][Y?YhhYfYfYbhgWXY]XYbG]WkZØfX]YG]bbU\aYjcb5WkhUnc`Ua]XfB]UaclŁźiainiVYgWkYib][Ybžk]YgWkbY``g]Wk]\f?OfdYfUbX]Y<0\Y [YkO\bh"Gg]ghYXcWkYfkA\bYbgkYfhžXUggXUgAYX]_UaYbh]bYb][Yb@AbXYfbžY]bgWkYfkzXUggXUgAYX]_UaYbh]bYb][Yb@AbXYfbžY]bgWkYfkzXUgAYX]_UaYbhYb]Ybžb]Wkhini[Y`UggYb]gh"\Af5fnh_Ubb\AbYbfUhYbžXUgAYX]_UaYbhY]b][YHU[Yjcf9ffY]WkYbXYf<0\YY]bnibY\aYbžia\AYX]_UaYbhYJb][YHU[Yjcf9ffY]WkYbXYf<0\YY]bnibY\aYbžia\AYX]_UaYbhYJb]CbXUfUiZinihYghYb"$

8]YgY'GW\f]hhY'gc``hYb'\Y`ZYbž'X]Y'GmadhcaY'ni'`]bXYfbž'UVYf'k]Y XUg'Gdf]W\k cfh'gU[hž']gh'J cfVYi [Yb'VYggYf'U`g'<Y]`Ybž'U`gc VYZc`[Yb'G]Y'X]Y'Zc`[YbXYb'GW\f]hhY'j cf'\LambdafYf'FY]gY"

5h`Ug'/ '6cchg'DYhYf'Ui Z'XYa ';]dZY``XYg'9`Vfi g'Ui Z') "* (& a fl%, ") %\$ 'ZhŁ

J 9FA 9 = 89B G = 9.8 = 9.5 < 2.5 < 9B ? F5B? < 9 = 14.5

J Yfa Y]XYb 'G]Y 'Ygž']b '\cW\ [Y`Y[YbY 'GhÀXhY 'ni 'Z]Y[Yb. 'K Ybb 'G]Y _\ObbYbž'j Yfa Y]XYb 'G]Y 'Ygž'X]fY_h ']b '\cW\ [Y`Y[YbY 'GhÀXhY 'k]Y 7 i gWcž'@U 'DUn 'cXYf'@\ UgU 'ni 'Z]Y[Yb" 'K Ybb 'X]Yg 'b]W\ h'a O[`]W\]ghž'j Yf[Yk]ggYfb 'G]Y 'g]W\ 'i bVYX]b[hž'XUgg'G]Y 'X]Y 'Zc`[YbXYb GW\ f]hhY 'VYZc`[Yb"

5___`]a Uh]g]YfYb.`K Ybb`G]Y`\O\Yf`U`g`&"(\$\$`a `f["\$\$\$`: i » Ł
_`YhhYfbž'j YfVf]b[Yb`G]Y`a]bXYghYbg`Y]bY`BUW\h`]b`a]hh`YfYf
<O\Yž'VYj cf`G]Y`\O\Yf`_`YhhYfb"`6Yj cf`G]Y`ni a `6Y]gd]Y``Y]bY
A UW\i `D]WW\i !K UbXYfi b[`VY[]bbYbž'j YfVf]b[Yb`G]Y`ni Yfgh`nk Y]
B AW\hY`]b`7i g\C'

 $B] YXf] [gWX`UZYb.`GWX`UZYb.G]Y`]b`Y]bYf`b]YXf] [YfYb`< O\Y`U`g hU[gØVYf"` 7`]a V`\] [\ž`g`YYd``ck `]gh`X]Y`[Àb[][Y`DfUI]g`ZØf X]Y`Yb] [Ybž`X]Y`NY]h`]b`[fc» Yb`< O\Yb`j YfVf]b[Yb"$

 $GhY][YbG]Y``Ub[gUaUiZGcVU`XG]Y`ØVYf''"$$$`a`f\%$"$$$:i*Eg]bXžYf\O\YbG]Y`X]Y`<O\Yž']b`XYfG]Y`gWX`UZYbž'b]WAhia`aY\fU`g')$$`a`dfc`BUWAh''G]Y`_ObbYb`hU[gØVYf'\O\Yf'_`YhhYfbž'gc``hYbUVYf']b`XYf'BUWAhinijcfini`Y]bYa``@U[Yf'nifØW__Y\fYbž'XUg'b]WAhaY\f'U`g')$$`a``ØVYf'XYa``AYYfYggd]Y[Y```]Y[h'', VYfZcfXYfb`G]Yg]WX`Ui*YfXYa``b]WAhini`gY\f''`FY[i`]YfYb`G]Y`\Af'HYadc'ibX[Y\Yb`G]Y`Ua``YfghYb`HU[``Ub[gUaYf'U`g'bOh]["$

 $DYhYf'fBf]hhYfL'ibX'gY]bY'A]h_`YhhYfYf'ghY][Yb'`Ub[gUa'UiZ\'z'iaXUg'F]g]_c'Y]bYf'<\mathring{O}Yb_fUb_\Y]h'ni'a]b]a]YfYb$

ŸbXYfb'G]Y'=\fY'9fbÀ\fib[.'JYfaY]XYb'G]Y'gWkKYfY'AU\`nY]hYbž VYjcf'G]Y'X]Y'<Ò\Y'YffY]WXYbž'UVYf'YggYb'G]Y'Xcfh'Y]bY _U`cf]YbfY]WXY'9fbÀ\fib['a]h'j]Y`Yb'?c\`Yb\mXfUhYb'k]Y'6fchž AØg`]'ibX'BiXY`b"'fMUmž'<Ò\Y°Ł'Hf]b_Yb'G]Y'j]Y`'KUggYf'ibX jYfaY]XYb'G]Y'FUiWXYb'ibX'5`_c\c`"

 $\label{eq:continuous} $JYfk YbXYb^G]Y^GcbbYbWfYa Y^ibX^GcbbYbVf]^Y.^Ia^= f $$U^*[YaY]bYg^K c^YYZ]bXYb^i]b^XYf^i< O^Y^ni^gWk ØhnYbz^ghY^Yb^G]Y $$g]WkYfz^XUgg^G]Y^ni gAhn^]WkYb^GcbbYbgWki hn^j Yfk YbXYb^i bX^Y]bYGcbbYbVf]^Y^cXYf^GWki hnVf]^YYY]bdUW_Ybz^i a^g]Wk^j cf $$GWkbYYV^]bXYY]h^ni^gWk ØhnYb"$

9fk À[Yb'G]Y'HUV'YhhYb'[Y[Yb'<Ò\Yb_fUb_\Y]h'K]Y']a

j cf\Yf][Yb'5VgW\b]hh'Yfk À\bhž'a ÒW\hYb'G]Y'j]Y'`Y]W\h'j cf'6Y[]bb

\[
\text{A\fiff}]gY'A YX]_Ua YbhY'[Y[Yb'<Ò\Yb_fUb_\Y]h'k]Y'8]Ua cl

Y]bbY\a Yb"'6YUW\hYb'G]Yž'XUgg'8]Ua cl'b]W\h']b'U``Yb'@\AbXYfb

Yf\A`h`]W\']gh'i bX'BYVYbk]f_i b[Yb'\UVYb'_Ubb"'?cbgi `h]YfYb'G]Y

XU\Yf'Y]bYb'5fnh'i a 'FUh"

 $= \{bcf]YfYbG]YX]YgYbG[fibXYGYbYGHgWXYDFUhgWXYU[B]WXhBBUVY] \\ gd]YYhYgGY]bYFCYYZCVG]YZ]hZGYGJYZJhZG[YgibXTibXYU_h]jG]bX"8]Y \\ < OYb_fUb_YJhYaUWXhY_YJbYbTIbhYfgWX]YXZYYYfY]hYbGJYGJWXUYgCFYWXhYY]hJGYZGXYYYJCFghYYYbXYFY]gYYJbYjCYYbYNØ[YbniGYb]YYYbYY$

J]Y`; `ØW °

@Y]hV]`X. '8fYUa gh]a Y

8 Y hU]`g

6Ygi WXYb G]Y i bg Ui Z Y]bY!fY]gY "XY