PTRL5003

K Y```DfYggi fY'HYgh]b[

HYfa "H\fYY" ## "&\$&\$

7ci fgY^{*}Cj Yfj]Yk

GhJZZ 7 cbhJWh 8 YhJ] g

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUhjcb	D\cbY
DYma Ub	dYmaUb4 i bgk "YXi"Ui			\$&-',))%&&
A cgHJ[\]a]				

@YWhi fYfg

BUa Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
5\a UX [.] 8Y\[\Ub	U"XY\[\Ub_\U`]`]4			
?\U`]`]				

8Ya cbghfUhcfg

B Ua Y	9a U]`	5j U]`UV]`] m	D\cbY
HfU]k]h7\ib[lfU]k]h"Wib[4 ibgk"YXi"Ui		

GW.cc`7cbhJWh′±bZcfa Uh]cb

7ci fgY 8YHJ] g

7 fYX]hDc]bhg *

Gi a a UfmcZh\Y'7ci fgY

H\YcfmcZffUbg]Ybhik Y``'hYgh]b["'DfUW]WU``UgdYWg`cZXYg][b`UbX'dYfZcfa UbW'`cZZ]Y`X'hYgh]bgffi a YbhUh]cb" DfYggi fY`XfUk Xck b'HYghg": U``!cZZhYghg"'A i `h]!fUhY'hYghg"; Ug'k Y``'hYgh]b["': `ck !UZhYf!Zck "'=gcW.fcbU``UbX]gcW.fcbU``a cX]Z]YX"'=bhYfZYfYbW''hYgh]b["'Di `gY'hYgh]b["'8 f]``ghYa 'hYghg": fUWi fYX'fYgYfj c]f'hYghg" 5bU`mg]g'cZa i `h]d\UgY'Zck 'hYghg"

7 ci fgY 5]a g

 $\label{thm:continuity:continuity:equation:def} $$HY'' U = (-1) Y''' U = (-1) Y'' U = (-1)$

7 ci fgY @YUfb]b[Ci hWca Yg

%" +bhYfdfYhih\Y'fYgYfj c]f'dfcdYffj\Yg'Zfca 'dfYggi fY'lfUbg]YbhXUlU
&" I bXYfghUbX'\ck 'X]ZZYfYbhfYgYfj c]f'dfcdYffj\Yg'k]```UZZYWhih\Y'dfYggi fY'lfUbg]YbhXUlU
' " A Ulh\Ya Ulfj\WU``mYI dfYgg'X]ZZYfYbhZck 'VY\Uj]ci f'ffY[]a Ygb']b'h\Y'fYgYfj c]f
(" 8 Yj Y'cd'fYgYUfW\'UbX'Wca a i b]\WUlfjcb'g_]``g'UbX'glfUhY[]Yg'h\Uhk ci `X'gi ddcfhih\Y'F YgYUfW\
Dfc^YWhWca dcbYbhcZh\Y'dfc[fUa "

HYUWX]b['GhfUhY[]Yg'

D`YUgY fYZYf hc h\Y]bZcfa Uh]cb]b A ccX`Y

5ggYgga Ybh

5ggYgga Ybh'HUg_g

5ggYgga Ybh'HJg_	K Y][\h	8i Y'8UHY	Gh XYbh@YUfb]b[Ci hWca Yg 5ggYggYX
5gg][ba Ybh	&\$I	Bch5dd`]WUV`Y	%ž`&ž`'
:]bU``YI Ua ') \$1	8if]b['h\Y'Yl Ua 'dYf]cX	%ž`&ž`'
A]XhYfa 'YI Ua '	&\$ı	'\$#%\$#&\$&\$`\$(.\$\$`DA	%ž'&ž''
F YgYUfWX Dfc YWfi	%\$ı	&%#%%#&\$&\$`%%\$\$`DA	%ž'&ž'' ž'(

5ggYgga Ybh'8YHJ]`g

5ggYgga Ybh'% '5gg][ba Ybh

 $\textbf{GhUfhXUhY}. \ \texttt{Bch5dd`]} \textbf{WUV`Y}$

8YHJ]`g.

5gg][ba Ybhg cb X]ZZYfYbh WX UdhYfg cZh Y Wci fgY

5ggYgga Ybh'& :]bU`'Yl Ua

 $\textbf{GhUfhXUhY}. \ \texttt{Bch5dd']WUV'Y}$

8YHJ]`g.

:]bU`YI Ua

5ggYgga Ybh' . A]XhYfa Yl Ua

GhUfhXUhY. Bch5dd`]WUV`Y

8YHJ]`g.

A]XhYfa 'YI Ua

5ggYgga Ybh'(. FYgYUfW Dfc YWh

GhUfhXUhY. Bch5dd`]WUV`Y

8YHJ]`g.

 $F\ YgYUfVX\ Dfc\ YWhicb\ K\ Y```HYghi5bU`mgYg$

F Ygci fWYg

DfYgWf]VYX F Ygci fWYg

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

H\Y'GWkcc``\Ug'XYj Y`cdYX'U'[i]XY`]bY'hc'\Y`d'mci'k\Yb'gi Va]hh]b['U'Wci fgY'Ugg][ba Ybh'

K Y YbWci fU[Y'mci'hc'fYhJ]b'U'WcdmcZYj YfmUgg][ba Ybhgi Va]hYX'Zcf'UggYgga YbhZcf'mci f'ck b'fYWcfX Y]hYf']b'YUfXWcdmcf'Y'YWfcb]WZcfa "

5 "UggYgga Ybhg a i gh\Uj Y Ub UggYgga YbhWcj Yf g\YYhUHUWXYX"

@UhY Gi Va [gg]cb cZUb 5gg][ba Ybh

: i ```a Uf_g`Zcf`Ub`Ugg][ba Ybh'UfY`cb`mdcgg]V`Y`k \Yb`Ub`Ugg][ba Ybh]g`fYVW]j YX`Vmh\Y`Xi Y`XUhY"`

K Y'i bXYfgHJbX'h\UhiUhih]a Yg'mci 'a Umbch'VY'UV'Y'hc'gi Va]hiUb'Ugg][ba Ybh'cb'h]a Yž'UbX'h\Y'GW\cc``k]``UWWca a cXUhY'UbmZJ]f'UbX'fYUgcbUV'Y'YI hYbg]cb"'K Y'k ci `X'fYWca a YbX'mci 'fYj]Yk 'h\Y'I BGK 'GdYWJU` 7 cbg]XYfUh]cb'[i]XY`]bYg'—'gYY'gYWfJcb'VY'ck "

@UhY`gi Va]gg]cb`k]``bchVY`UVWYdhYX`UbX`k]``VY`Wcbg]XYfYX`Ug`bc`gi Va]gg]cb"

GdYWJU`7cbg]XYfUhJcb

Mci 'Wub'Udd`mZcf'gdYWJU`'Wcbg]XYfUhJcb'h\fci [\'<u>H\Y'Bi WYi g'Gh XYbh<i V</u>'k\Yb']``bYgg'cf'ch\Yf WJfW a ghUbWfg']bhYfZYfY'k]h\'mci f'UggYgga YbhdYfZcfa UbWf'''G]W_bYggža]gUXj Ybh fY'cf'ch\Yf WJfW a ghUbWfg'VYmcbX'mci f'Wcbhfc``a Um

- DfYj Ybhmci Zfca 'Wca d'Yhlb['U'Wci fqY fYei]fYa Ybh
- ? YYd 'mci 'Zfca 'UthYbX]b['Ub'UggYggUV'Y'UWhj]hm
- Ghodimoi igi Va]hhlb['UggYggUV'Y'k cf 'Zcf'U'Wci fgY

K YʻUg_ʻh\Uhmci 'd`YUgY WcbhUWh\Yʻ7 ci fgYʻ7 cbj Ybcfʻ]a a YX]UhY`mcbWYʻmci '\Uj Y`Wca d`YhYX'h\YʻgdYW]U` Wcbg]XYfUh]cbʻUdd`]WUh]cbžbc``UhYf'h\UbʻcbY`k YY_`Zfca 'gi Va]gg]cb"

A cfY XYHJ] \dot{g} cb \dot{g} dYWJU \dot{w} bg]XYfUh]cb \dot{w} bb \dot{v} Y \dot{z} ci bX \dot{u} b \dot{k} k k \dot{g} h \dot{x} Y bh'i bgk \ddot{y} Xi \ddot{u} i \ddot{y} dYWJU \dot{w} bg]XYfUh]cb

Gh XYbhGi ddcfh

H\Y`I b]j Yfg]lmUbX`lh\Y`: UW`lmdfcj]XY`U`k]XY`fUb[Y`cZgi ddcfhgYfj]Wyg`Zcf`gh XYblgž]bWi X]b[.

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

Mci f`YWi fYf'UbX'h\Y'I b]j Yfg]lmk]``YI dYWimci f`gi Va]lhYX'Ugg][ba Ybhg'UfY'hfi `mmci f`ck b`k cf_"'I BGK \Ug'j YfmWYUf'[i]XY`]bYg'cb'k \Uhd`U[]Uf]ga `]g'UbX'\ck 'hc'Uj c]X']h'D`U[]Uf]ga `]g'i g]b['h\Y'k cfXg'cf]XYUg'cZch\Yfg'UbX'dfYgYbh]b['h\Ya 'Ug'mci f`ck b"'D`U[]Uf]ga `]g'U'mdY'cZ]bhY``YWi U`'h\YZh'=h\Wb'hU_Y a UbmZcfa gžZfca `XY`]VYfUhY'W\YUh]b['hc'UW\]XYbhU``mWcdm]b['Zfca 'U'gci f\W'k]h\ci h\Uw_bck `YX[Ya Ybh' H\Y'I b]j Yfg]lm\Ug'UXcdhYX'Ub'YXi \Whjj Y'UddfcU\W 'hc'd`U[]Uf]ga 'UbX'\Ug'XYj Y`cdYX'U'fUb[Y'cZ fYgci f\W'g'hc'gi ddcfhghi XYbhg"'5``h\Y'XYhU]`g'cb'd`U[]Uf]ga ž]bWi X]b['gca Y'i gYZ ``fYgci f\W'gž\Wb'VY Zci bX'Uhk k k "qhi XYbh" bak "YXi "Ui #d`U[]Uf]ga "

 $5\ensuremath{^{\circ}}\aligned 5\ensuremath{^{\circ}}\aligned 5\ensuremath{^{\circ}}\aligned 6\ensuremath{^{\circ}}\aligned 6\ensuremath{^{\circ}}\$

5 WUXYa]W + DZcfa Uh]cb

7 ci fgY F Ygi `hg

: cf[']XYfU][']g[']cb[']I BGK [']UggYgga Ybh'dc[']]Whž'd[']YUgY[']j]g]h '<u>k k k "gh XYbh'i bgk "YXi "Ui #UggYgga Ybh</u>

 $\pm gca\ Y']bgHUbW'g'mci\ f'Z]bU``Wci\ fgY'fYgi\ `hia\ Um'VY'k\]h\ Y`X'UbX'bch'fY'YUgYX'cb'h\Y'I\ BGK 'd`UbbYX'XUHY'' H\]g']g']bX]WUHYX'VmU'Wci\ fgY'[\ fUXY'fYgi\ `hicZY]h\ Yf.$

• @9 '-']bX]\WUhYg'mci '\Uj Y'bch\Wca d'YhYX'cbY'cf'a cfY']hYa g'cZUggYgga Ybh/cf

- VfcUXVUbX'WcbbYWfjcb'f&) * '_V]h#gYWcf'ZUghYfŁ
- UV]]mhc'j]Yk 'ghfYUa]b['j]XYc'f\][\'cf'`ck 'XYZ]b]h]cb'l BGK 'HJ 'cdh]cbgŁ

A cfY]bZcfa Uh]cb UVci hgmghYa 'fYei]fYa Ybhg]g Uj U] UV Y UhKkk mgh XYbh'i bgk "YXi "Ui #a ccX Y! gmghYa!fYei]fYa Ybhg

.

5 WWYgg]b['7ci fgY'A UhYf]U`g'H\fci [\'AccX`Y

7 ci fgY'ci h]bYgžgi ddcfna UhYf]U`g`UfY'i d`cUXYX`hc`A ccX`Yž'h\Y'i b]j Yfg]lmighUbXUfX`@YUfb]b[A UbU[Ya Ybh'GmghYa 'f@A GŁ"'+b`UXX]r]cbžcb!`]bY`Ugg][ba Ybh'gi Va]gg]cbg`UfY`a UXY'i g]b['h\Y Ugg][ba Ybh'XfcdVcl 'ZUVJ']lmdfcj]XYX`]b'A ccX`Y"'5```Ybfc``YX'gh XYbhg`UfY`Ui hca Ur]VW\`m]bWl XYX`]b

K_Y`UW_bck_`YX[Y`h\Y`6YXY[U``dYcd`Y`k\c`UfY`h\Y`'fUX]h]cbU``W_ghcX]Ubg`cZh\Y``UbXg`cb`k\]W\`I_BGK ?Ybg]b[hcb`WJa di_g`]g``cWJhYX"