HYfa 'Hk c''#'&\$&%

PTRL3001

FYgYfjc]f'9b[]bYYf]b['6

7 ci fgY⁻Cj Yfj]Yk

GHJZZ7cbHJWh78YHJ]`g

7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]m	@cWUhjcb	D∖cbY
: i feUb`@Y! <i ggu]b<="" th=""><th>∄ feUb"∖i ggU]b4 i bgk "YXi "Ui</th><th>H67</th><th>&% ⁻H9H6</th><th>- ' ,) [`]) % +</th></i>	∄ feUb"∖i ggU]b4 i bgk "YXi "Ui	H67	&% ⁻ H9H6	- ' ,) [`]) % +

GWX.cc``7cbHJWhi=bZcfaUh]cb

GW&cc``cZA]bYfU`g`UbX`9bYf[mFYgcifWfg C`X`AU]b`6i]`X]b[ž`@YjY``%z`%)-`f?%)Ł IBGK `GM8B9MBGK`&\$)&`5IGHF5@=5

<u>9b[]bYYf]b['Gh XYbhGYfj]Wg</u>'

9. a YfY"hYUW.]b[4 i bgk "YXi "Ui

K. <u>k k "Yb[]bYYf]b["i bgk "YXi "Ui #a]bYfU`g!YbYf[mfYgci fWg</u>

7cifgY[·]8YHJ]`g

7 fYX]hDc]bhg***

Gi a a UfmcZhXY7ci fgY

FYWcjYfmZJWrcfgžacV]`]gUh]cbžX]gd`UWYaYbhUbX`gkYYd`YZ]W]YbW]Yg"`:fUWf]cbU``Zck`UbUmg]g`UbX X]gd`UWYaYbhYZ]W]YbWrh`<YhYfc[YbY]rmUbX`[fUj]]rmgY[fY[Uh]cb`UbX`h\Y]f`YZYWrcb`fYWcjYfm'`KUhYf`UbX [Ug`Wcb]b["`LbghYUXm!ghUhY`Z]Y`X`kUhYf`]bZiL`WU`W`Uh]cbg"`8YhYfa]bUh]cb`cZUei]ZYf`dUfUaYhYfg`Zfca \]ghcfmaUhW\]b["`DgYiXc`fY`Uh]jY`dYfaYUV]`]rmUbX`jYfh]WU`Yei]`]Vf]ia"`8YW]bY`W`fjY`UbU`mg]g"

7cifgY`@YUfb]b[`CihWcaYg

5ZhYfigi WWYggZ ``mWcad`Yhjb[h\]giWcifgYžmci ig\ci `X'VY'UV`Y'hc.

@YUfb]b[`CihWcaY	95 GHJ[Y %7ca dYhYbW]Yg
%"T bXYfgHUbX'Z bXUa YbHU``a YW\Ub]ga g`fYgdcbg]V`Y`Zcf`Zi]X X]gd`UWYa Ybhicb`U`dcfY`gWU`Y`]b`U`fYgYfj c]f`fcW_ž`gi W\`Ug]bHYfZUW]U``HYbg]cbž'k YHUV]`]mž`WUd]``UfmidfYggi fY`UbX`H\Y]f a YUgi fYa YbhHYW\b]ei Yg	D9%"%
&"`I_bXYfgHUbX`Z_bXUa_YbHU``a_YVXUb]ga_g`fYgdcbg]V`Y`Zcf]a_V]V]hjcb`UbX`XfU]bU[_Y`X]gd`UV¥a_Ybhg	D9%"%
' "`L bXYfgHJbX`Z bXUa YbHJ``a YW\Ub]ga g`fYgdcbg]V`Y`Zcf`j Yfh]WJ` Yei]`]Vf]i a `UbX`Zi]X`X]ghf]Vi h]cb`]b`fYgYfj c]f`fcW_	D9%"&ž`D9%")
("`L_bXYfgHUbX`Z_bXUa_YbHU``a_YVXUb]ga_g`fYgdcbg]V`Y`Zcf`Zi_]X fY`UHjj_Y`dYfa_YUV]`]hm`]b`Hk_c!d\UgY`UbX`H\fYY`d\UgY`gmgHYa_g	D9%"%žD9&"%
)""I bXYfgHUbX`VUg]Wa]WfcgWcd]WUbX`a UWfcgWcd]WfYWcj Yfm YZZJW}YbW}Yg`Zcf`H\Y`fYgYfj c]fg`dfcXi WYX`i bXYf`bUh fU``cf`ZcfWYX k UHYf`Zi I `UbX`H\Y`]bZi YbWY`cZa cV]`]mifUh]cž`\YHYfc[YbY]miUbX [fUj]micb`H\Y`cj YfU```c]`fYWcj Yfm	D9%'' žD9&"&žD9&"%
*"`8YhYfa]bY`dgYiXc!ZbWhjcbg`UbX`Udd`mh\Ya`hc`fYgYfjc]f`UbX Zi]X`dfcdYfhjYg	D9&"&
+"`5dd`mbUhifU``kUhYf`ZiliacXY`g	D9&"&ž [.] D9' "(
,"'I bXYfgHUbX'hmdYg'cZkY``XYW]bY'fUhYg'UbX'i bXYfgHUbX'h\Y]f fc`Y']b'Z]Y`X'dfcXi Wh]cb'ZcfYWUgh]b['UbX'fYgYfj Yg'Ygh]a Uh]cb	D9&"' žD9' "'

HYUWX]b[GhfUhY[]Yg

 $D^{Y}UgY^{f}YZ'f^{h}c^{h}Y^{J}bZcfa^{Uh}cb^{J}b^{A}^{c}cX^{Y}$

5ggYgga Ybh

5ggYgga YbhHUg_g

5ggYgga Ybhˈt͡IJg_	K Y][\h	8iY [°] 8UHY	GhiXYbhi@YUfb]b[CihWcaYgʻ5ggYggYX
Ei]n [.] %	' \$I	%%#\$+#&\$&%`\$).\$\$`DA	%ž`&ž`' Ž`(Ž`)
:]bU``9I Ua `) \$I	91 Ua "Ha YHJV"Y	%ž`&ž`'Ž`(Ž')Ž`*Ž'+Ž',
5gg][ba Ybh&)	'\$#\$+#&\$&%`\$).\$\$`DA	* Ž +
5gg][ba Ybh 7 UgY cZGh Xm %	%) ı	'\$#\$+#&\$&%`\$).\$\$`DA	(Ž)

5ggYgga Ybh8YHJ]`g

5ggYgga Ybh% Ei]n%

8 YHJ]`g.

E i]n'%

5ggYgga Ybh&:]bU`'9l Ua

8YHJ]`g.

:]bU``9I Ua

5ggYgga Ybh' . 5gg][ba Ybh&

8YHJ]`g.

Wcb]b['UbX'dYhfc`Yi a 'fYgYfj Yg

5ggYgga Ybh(. 5gg][ba Ybh 7UgY cZGH Xm% $\,$

8YHJ]`g.

C]`fYWcjYfmWU`W`UH]cbg

FYgci fWfg

FYWca a YbXYX FYgci fWYg

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

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

H\Y'GW\cc``\Ug'XYjY`cdYX'U'[i]XY`]bY'hc'\Y`d'mci'k\Yb'giVa]hhjb['U'WcifgY'Ugg][baYbh'

K Y`YbWcifU[Y`mci`hc`fYHU]b`U`WcdmcZYjYfmUgg][baYbhgiVa]HYX`Zcf`UggYggaYbhZcf`mcif`ckb`fYWcfX Y]h\Yf`]b`\UfXWcdmcf`Y`YWffcb]WZcfa"

5```UggYgga Ybhg`a i gh\Uj Y`Ub`UggYgga YbhWcj Yf`g\YYhUhUV&YX"

7cifgY'Wcad`Yh]cb

7 ci fgY Wea d`Yh]cb`fYei]fYg`gi Va]gg]cb`cZU```UggYgga Ybh`]hYa g":: U]`i fY`hc`gi Va]hU```UggYgga Ybh`]hYa g a UmfYgi `h`]b`h\Y`Uk UfX`cZUb`I bgUh]gZUWcfm:: U]`i fY`fI : Ł`[fUXY`Zcf`h\Y`7 ci fgY`i b`Ygg`gdYW]U` Webg]XYfUh]cb`\Ug`VYYb`gi Va]hhYX`UbX`Uddfcj YX"`D`YUgY`bchYž`U`Wea dYhYbWm\i fX`Y`cZ) \$i ``]g`Udd`]YX`hc h\Y`Z]bU``UggYgga Ybh'

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

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

K Y'i bXYfgHUbX'h\Uh'Uh'h]a Yg'mci 'a Umbch'VY'UV'Y'hc'gi Va]h'Ub'Ugg][ba Ybh'cb'h]a Yž'UbX'h\Y'GV\\cc``k]`` UVW&a a cXUhY'UbmZU]f'UbX'fYUgcbUV'Y'YI hYbg]cb"'K Y'k ci `X'fYV&a a YbX'mci 'fYj]Yk 'h\Y'I BGK 'GdYVJU` 7 cbg]XYfUh]cb'[i]XY`]bYg'-gYY'gYWf]cb'VY'ck "

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

GdYWJU``7cbg]XYfUh]cb

- DfYj Ybhimci Zfca 'Wca d'Yhjb['U'Wci fgY'fYei]fYa Ybh
- ? YYd mci 'Zfca 'UHYbX]b['Ub'UggYggUV'Y'UWf]j]m
- Ghcdimci igi Va]hh]b[iUggYggUViYik cf_iZcfiUiWci fgY
- G][b]ZWUbhmUZYWhinci f`dYfZcfa UbW']b`UggYggUV`Y`k cf_žVY`]hU`Zcfa U``YbX!cZgYa YghYf YI Ua]bUh]cbž'U`WUgg`hYghž'U``UVcfUhcfmhYghž'U`gYa]bUf`dfYgYbhUh]cb`cf`Ubmch\Yf`Zcfa `cZ UggYgga Ybh

K Y`Ug_`h\Uhimci `d`YUgY`WcbhUWih\Y`7 ci fgY`7 cbj Ybcf`]a a YX]UhY`mcbWY`mci `\Uj Y`Wca d`YhYX`h\Y`gdYW]U` Wcbg]XYfUh]cb`Udd`]WUh]cbžbc``UhYf`h\Ub`cbY`k YY_`Zca `gi Va]gg]cb"

A Vý INTO 700 700 700 700 700	А	. MÀ	h\Yb	‰	‰	‰	%。	‰
-------------------------------	---	------	------	---	---	---	----	---

- | BGK `@YUfb]b[`7YblfY`!`<u>k k k "`\\ii bgk "YXi "Ui</u>
- 7 ci bgY``]b['gi ddcfh! '<u>k k k "Wci bgY``]b["i bgk "YXi "Ui</u>

9ei]HUV`Y`@YUfb]b[`GYfj]VW`g`U]a g`hc`dfcj]XY`U```ghi XYbhg`k]h\`U`ZYY`UbX`WcbZ]XYbh]U``gYfj]WY`h\Uh dfcj]XYg`dfUWh]WU``gi ddcfhihc`Ybgi fY`h\Uhimci f`\YU`h\`WcbX]h]cb`XcYgbfhiUXj YfgY`mUZZYWhimci f`ghi X]Yg''` \hhdg.##ghi XYbh'i bgk "YXi "Ui #Y`g

5₩UXYa]W=bZcfaUh]cb

7 ci fgY FYgi `hg

: cf^{*}XYHJ]`gʻcbʻI BGK ^{*}UggYgga Ybhdc`]Whž'd`YUgYʻj]g]h<u>'k k k "gh XYbH'i bgk "YXi "Ui #UggYgga Ybh</u>

=b`gcaY`]bgHJbWYg`mcifZ]bU``WcifgY`fYgi`haUmVY`k]h\\Y`X`UbX`bchfY`YUgYX`cb`h\Y`IBGK`d`UbbYX`XUhY" H\]g`]g`]bX]WJhYX`VmU`WcifgY`[fUXY`fYgi`hcZY]h\Yf.

- @9'-`]bX]WUhYg'mci `\UjY'bchWcad`YhYX'cbY'cf'acfY']hYag'cZUggYggaYbh/cf
- K 8 --]bX]WUhYg'h\YfY']g'Ub']ggi Y'k]h\cbY'cf'a cfY'Ugg][ba Ybh/cf
- K 7 '--'k \]W\ ']bX]WUHYg mci '\Uj Y 'Udd`]YX 'Zcf'GdYW]U` '7 cbg]XYfUH]cb'Xi Y 'hc']``bYgg'cf'a]gUXj Ybhi fY UbX'H\Y Wci fgY'fYgi `hg'\Uj Y 'bch'YYb'Z]bU`]gYX"

⊕ Y]h Yf Yj Ybh]hk ci X'VY mci f fYgdcbg]V]]mhc WebhUWhAY 7 ci fgY 7 cbj YbYf Ug gccb Ug dfUWŋWUYY Vi h bc ``UhYf h Ub Zj Y f) EXUmg UZhYf fY YUgY cZh Y Wei fgY fYgi `h' Zmci `Xcb'h WebhUWhAY Webj YbYf cb h]a Yž mci `a UmVY fYei]fYX hc fY!gi Va]hUb Ugg][ba Ybhcf fY!g]hh Y ZjbU`YI Ua `UbX`a UmfYgi `h`]b mci `ZJ]`]b[`h Y Wei fgY" Mci `k ci `X`U`gc`\Uj Y`U`B 7 fWei fgY bchWea d`YhYXE'a Uf_cb mci f`hfUbgWf]dhUbX`k ci `X`bYYX hc fY! Ybfc```]b h Y Wei fgY"

Ghi Xm]b['U'Wci fgY']b'h\Y'GW\cc``cZA]bYfU`g'UbX'9bYf[mFYgci fWfg 9b[]bYYf]b['Uh'I BGK

FYdcfhkf]h]b[[i]XY

H\Y`GW\cc``\Ug`U`<u>F YdcfhK_f]hb[`; i]XY`fF K ; Ł</u>`Uj U]`UV`Y"`5`WcdmicZh\]g`]g`Uj U]`UV`Y`cb`h\Y`Wci fgY A ccX`Y`g]hY"

7ca di h]b[FYgci fWrg UbX +bhYfbYh5WWrgg FYei]fYa Ybhg

IBGK `A]bYfU`g`UbX`9bYf[mFYgcifWfg`9b[]bYYf]b[`dfcj]XYg`V`YbXYX``YUfb]b[`ig]b[`h\Y`cb!`]bY`AccX`Y @AG`f@YUfb]b[`AUbU[YaYbhGmghYaŁ"`5`gc`gYY`!`HfUbg]h]cb]b[`hc`Cb`]bY @YUfb]b[.``<u>kkk"Wcj]X%ghiXmcb`]bY"ibgk"YXi"Ui</u>

+i]g'YggYbh]U``h\Uhmci `\Uj Y`UVWYgg'hc`U`D7`cf`bchYVcc_`Wa di hYf"A cV]`Y`XYj]WYg'gi W`Ug'ga Ufhid\cbYg UbX`HUV`Yhg'a UmWca d`]a Ybh`YUfb]b[ž`Vi hUVWYgg'hc`U`D7`cf`bchYVcc_`Wa di hYf"]g'U`gc`fYei]fYX"`BchY h\Uhigca Y`gdYW]U`]ghYb[]bYYf]b[`gcZh UfY`]g`bchUj U]`UV`Y`Zcf`A UWWca di hYfg"

- A]b]b['9b[]bYYf]b['Ghi XYbhg. 'CA 6'; (,
- DYhfc`Yi a '9b[]bYYf]b['Ghi XYbhg. H9H6'@, '('/'@, '')

⊨hi]gʻfYWca a YbXYXʻh\Uhimci `\Uj YʻfY[i `Uf`]bhYfbYhUWWYggʻhcʻdUfh]W]dUhYʻ]bʻZcfi a `X]gW gg]cbʻUbXʻ[fci d k cf_"'Hcʻfi bʻA ccX`Yʻa cghYZZYWfj Y`mžmci ʻg\ci `X`\Uj Y.

- VfcUXVUbX^{*}WcbbYWf]cb^{*}f&) * ^{*}_V]h#gYWcf^{*}ZJghYfŁ
- UV]`]hmihc j]Yk ghfYUa]b[j]XYc fl\][\ cf``ck XYZ]b]h]cb I BGK HJ cdh]cbgŁ

A cfY`]bZcfa Uh]cb'UVci hgmghYa 'fYei]fYa Ybhg']g'Uj U]'UV'Y Uh<u>k k k "ghi XYbh'i bgk "YXi "Ui #a ccX`Y!gmghYa !fYei]fYa Ybhg</u>

5W_bck `YX[Ya YbhcZ7ci bhfm

 $\label{eq:constraint} \begin{array}{l} K_{1}^{*}(UW_{bck}^{*})X_{1}^{*}(V,V) = K_{1}^{*}(V,V) = K_{1}$

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

Dfc[fUa`±bhYbXYX`@YUfb]b[`CihWcaYg	
?bck`YX[Y`UbX`g_]```VUgY	
D9%"%7cadfY\Ybg]jYzh\YcfmVUgYX`ibXYfgHJbX]b[`cZh\Y`ibXYfd]bb]b[`bUhifU``UbX d\mg]WJ``gW]YbWYg`UbX`h\Y`Yb[]bYYf]b[`ZbXUaYbHJ`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	
D9%" `ŧÐ!XYdh\`i bXYfghUbX]b[`cZgdYW]U`]ghVcX]Yg`cZ_bck `YX[Y`k]h\]b`h\Y`Yb[]bYYf]b[X]gW]d`]bY	
D9%"(`8]gWYfbaYbhcZ_bck`YX[Y`XYjY`cdaYbhUbX`fYgYUfW\`X]fYWjcbg`k]h\]b`h\Y Yb[]bYYf]b[`X]gWjd`]bY	
D9%")'?bck`YX[Y`cZYb[]bYYf]b[`XYg][b`dfUWf]WY`UbX`WcbhYIhiU``ZUWfcfg`]adUWf]b[`h\Y Yb[]bYYf]b[`X]gW]d`]bY	
D9%"*`I_bXYfgHJbX]b[`cZh\Y`gWcdYždf]bW]d`Ygžbcfa_gžUWWci_bHJV]`]h]Yg`UbX`Vci_bXg`cZ gi_gHJ]bUV`Y`Yb[]bYYf]b[`dfUWf]WY`]b`h\Y`gdYW]Z]WX]gW]d`]bY	
9b[]bYYf]b[`Udd`]WUh]cb`UV]`]m	
D9&"%5dd`]WUHjcb`cZYgHUV`]g\YX`Yb[]bYYfjb[`aYH\cXg`hc`Wcad`YI`Yb[]bYYfjb[`dfcV`Ya gc`j]b[
D9&"&": `i YbhUdd`]WUHjcb"cZYb[]bYYf]b["HYW\b]ei Ygžhcc`g"UbX"fYgci fWYg	