



HUMS2000

5 fmg' ðhY fbg\]d

Gi a a Yf' ##'&\$&%

GWXcc``cZGcWJU``GWYbWg`'#`I BGK ``5ffg`UbX`GcWJU``GWYbWg`



7ci fgY`Cj Yfj JYk

GhJZ`7cbhJW`8YhJ`g

7cbj Ybcfg

B Ua Y	9a Uj`	5j Uj`UVj]m	@cWjhcb	D\cbY
@ci JgY`Gh XXm	gh XXm4 i bgk "YXi "Ui	9a Uj`Zcf Uddc]oha Ybh	Fcca`%*)`!, ž]fghZccfž Acfj Yb`6fck b 6i]X]b[

GWcc`7cbhJW`bZcfa Uhjcb

GWcc`cZGcWU`GWYbWg

Fcca`%) -

Acfj Yb`6fck b`7 &\$

Ya Uj`.gcgg4 i bgk "YXi "Ui

d\cbY. '\$&-' ,)`% \$+

7ci fgY'8YHJ]`g

7fYX]hDc]bHg`*`

Gi a a UfmcZh\Y'7ci fgY

X]fYWYX`YUfbYfg"H\Y`7 ci fgY`7 cbj Ybcf'a YYhg`gh XYbhg`Ufci bX`XUm&cZ\Y]f`]bYfbg\]d`UbX`hYb`cb`Ub
Ug!bYYXg`VUg]g`k` \]ghdfcj]X]b[`Ya U]`UbX`#cf`h`Yd\cbY`UWXYa]Wgi ddcff`C bW`h`Y`gh XYbh`Ug

8i Y`*`da `cb` VSk \$*i Ž\$ US`W VSdi` Ww]e SXWdfZW`Sef VSk aXFZWhaUSf[a` S^b`SUW_ W f

- 7 f]h]WJ`mfYZYW`icb`k cf_`VUgYX`YI dYf]YbW`g`UbX`]bhYffc[UH`X]ZYfYbhUgdYW`g`cZcf[Ub]gU]cbU` hYcfmVch`cfU`mUbX`]b`k f]h]b[

8YHU]`g`cZUggYgga YbhiUg_g.

6mi bXYfU_]b[`hYgY`UggYgga YbhiUg_gžgh XYb]g`UfY`a YUbh]c`XYa cbghUHY`dfc[fYgg] Y`YUfb]b[`Vm d`Ubb]b[`UbX`VY]b[`]bj`c`j YX`]b`U`k cf_`VUgYX`dfc`YW`H`g`k]`fYgi`h]b`h`Y`dfcXi`W]cb`cZU`k Y`!Uf[i YX YggUmž`k \]W\`i`gYg`U`h`YcfYh]WJ`ZfUa Yk cf_`Zfca`cf[Ub]nU]cbU`h`YcfmUbX`]bW`c`f`d`c`f`U`H`g`]bg][\hg [U]bYX`Zfca`h`Y]f`j`c`W]h]cbU`d`UW`a`YbhYI`dYf]YbW`"

: cf`gh XYb]g`Xc]b[`a`cfY`h`Ub`cbY`XUmdYf`k`YY`_`h`]g`k`]`fYei`]fY`]bhYbg]j`Y`fYUX]b[`VY`Z`fY`UbX`U`h`h`Y`g`h`U`f`h`c`Z`h`Y`]b`h`Y`fbg`\]d`h`c`U`ck`U`XYei`U`H`Y`d`fY`d`U`f`U`h]cb`Z`c`f`h`Y`Z`f`gh`UggYgga`YbhXi`Y`cb`XUm`+`"A`Y`Y`h]b[`k`]h`@ci`]gY`G`h`XXmž`h`Y`5`W`X`Y`a`]W7`cbj`Ybcf`k`]`Ugg]gh]b`X]fYW]b[`h`Y`g`h`XYbh]c`Uddfcdf]U`H`fYUX]b[gž WUf]Z]b[`h`Y`d`U`f`U`a`Y`H`f`g`c`Z`c`f[Ub]nU]cbU`h`YcfmUbX`Ugg]gh]bW`k`]h`X`f`U`Z]b[`U`ei`Y`gh]cb`Z`c`f`h`Y`Z`f`gh`UggYgga`Ybh`"

ghfi Wñ fYX'Ug'hY'gh XYbhW'ccgYg'Y"["']bhc'ghU[Yg'cZ'hY']bhYfbg\]d'cf'i g]b['hY'gi [[YghYX'\YUX]b[g'cb
A ccX'Y"' #i]g]a dcfUbhH.Uh'hY'gh XYbhW'Ub]bX]WU'Y'hY'f'dfc [fYgg'cb'ck 'hYm'Uj Y'hYmYb[U[YX'k]h
hY''hYfU'h fY'UbX']XYbh]Zmk \Uh'YUfb]b['hYm'Uj Y'UW'Yj YX']b'UfYUg'gi W'Ug'hY'W'U''Yb[Y'cZa'cj]b[
Zca 'hY'I b]j Yfg]hmgY'h]b['hc'hY'k cf_d'UW' fYgdYW'U'm]Z]h]g'hY'f'Zfgh]bhYfbg\]d'Z'hY']a dUW'icZ
X]j Yfg]h'm'Ufci bX'hYa 'UbX'k \Uh'Yh']W''UbX'gcW'U'fYgdcbg]V']hY'g'UfY']bj'c'j YX']b'hY'f']bXi ghf'icf'UfYU
cZgdYW'U'm"' @]gh]b['_Ymg_]`g'UbX'bYk '_bck YX[Y [U]bYX'W'Ub'VY'']b_YX'hc'YI Ua d'Yg'Zca 'hY'gh XYbh]g
fc'Y'UbX'hUg_g'i bXYfU_Yb''

Hi fb]h]b'gY'h]b[. H\]g'Ugg][ba Ybh]g'gi Va]hYX'h'fci [\ 'Hi fb]h]b'UbX'gh XYbh]g'W'Ub'gY'Y'Hi fb]h]b'g]a]Uf]m
fYdcf'g''

5ggYgga Ybh' . C f[Ub]gU]cbU'YggUm

GHUfhXUHY . Bch5dd]WUV'Y

@Yb[h. '&\$\$\$'k cfXg

8YH]`g.

%cZ&'I :]bU'YggUm]g'&\$\$\$'k cfXg" K f]hY'b'ZYXVUW'k]h]b'%\$'k cf_]b['XUm]g''

5XX]h]cbU'XYH]`g.

H\]g'W]h]W'UbU'm]g'Vi]Xg'cb'hY'YggUm]gi a a Ufm'U'fYUXm]gi Va]hYX'i g]b['U'g]a]Uf'ghfi Wñ fY'UbX'hY
gUa Y'ei Ygh]cb'#ghU'Ya Ybh'G'h XYbh]g'UfY'YI dYW'YX'hc' \Uj Y'W'cb]h]bi YX'hc' fYUX'h'fci [\ci h'hY
]bhYfbg\]d'hc'Z]bX'UXX]h]cbU''hYfU'h fY'UbX'hc']bW'f'cd'fU'h'gi [[Ygh]cbg]b'hY'ZYXVUW']dfcj]YX'cb'hY
gi a a Ufm' @Y[Ubhc']dfcj]XYg'U'ghUf]h]b['dc]bhk]h' _Ym'hYI hg'cb'Vch'B: D'UbX'dfcZ]h'cf[Ub]nU]h]cb'Vi h
gh XYbh]g'bYX'hc' 'cWU'Y'gdYW'Z]WUf]h]WY'g'#]bZ'fa U]h]cb'h'Uh'dYfU]b'hc'hY'f'c'gh'cf[Ub]nU]h]cb'#fY'Yj Ubh
]bXi ghf'm'7'YUf'YI Ua d'Yg'Zca 'hY'gh XYbh]g'\cgh'cf[Ub]nU]h]cb'UfY'hc']dfcj]YX'UbX'']b_YX'hc'hY
gY'YW'YX''cf[Ub]nU]h]cbU'W'ca dcbYbh]g'hc'XYa'cbgh'fU'h'gc'X'fYUX]b['UbX'fYZYW]cb'cb'hY'hc'd]Wg'Ug'k Y''Ug
hY'gh XYbh]g'UV']h]m]hc'h'UgY'ci h'ck'fY'Yj Ubh'hY''hYfU'h'fY']g'hc'hY'f'gdYW'Z]W'cgh'G'h XYbh]g'UfY
YbW'ci fU[YX'hc'a Y'Yh'k]h'hY'f'c'gh'gi dYf]]gcf'fY[i 'Uf'm]f]Z'cf'gi dYf]]g]cb'UbX'hc' [U]b'ZYXVUW'cb'hY'f'
k cf_]Vi h'hc'U'gc']a U_Y']h]a Y'hc'X]gW'gg'hY'f'YggUm]hc'd]Wgc'Ug'hc' [U]b' [fYU'h'f']bg][\hg']bhc'hY
cf[Ub]nU]h]cb]g'Z' bW]cb]b['UbX'dfcW'ggYgZ'\]g'hc'f'mZ'W'h'fY'UbX'hc' 'YUfb'\ck'hc' 'UW'W'gg'Ubm'fY'Yj Ubh
XcW'a Ybh]g'f'a]gg]cb'ghU'Ya Ybh]g'Z'Ubbi U'fYdcf'g'Y'hW''G'i dYf]]gcf'g'g']ci 'X'\Uj Y'VY'Yb']dfcj]YX'k]h'U
Vf]Y'Z'ci h]bY'cZ'hY'<I A G&\$\$\$'UggYgga Ybh]g'Vi h'k]''bYX']bdi h'cb'k \Uh'hY'gh XYbh]g'Z'W'gg]b['cb''5h
bc'h]a Y'XcYg'hY'gh XYbh]bUa Y'hY'c'gh'cf[Ub]nU]h]cb'Vi hfY'Z'fg'hc'hY'c'gh'

Gh XYbh]g'UfY'hc'XYa'cbgh'fU'h'Ub']b]XYd'h'Yb[U[Ya Ybh]k]h'hY'fY'Yj Ubh'h'Y'cfY'h]W''_bck YX[Y'UbX'hc'VY
UV'Y'hc'X]gW'gg'h]g'k]h]b'hY'k]XYf'W'cb]h]i hcZ'5i ghfU']Ub'UbX'cf'#cj YfgYUg'k \YfY'dcgg]V'Y''5g'h]g']g'Ub
cf[Ub]nU]h]cbU'UbU'm]g]gZ'gh XYbh]g'bYX'hc'g'ck'gci bX'g_]`g']b'cWU]h]b[Z'Yj U'i U]h]b['UbX'i g]b['fY'Yj Ubh
]bZ'fa U]h]cb'Ug'k Y''Ug'gi g]b['hY'f']b]h]U]h] Y'UbX'W'YU]h]]h]m]b'hY'a UbbY'f']b'k \]W'hYm'Udd'f'c'UW'hY'hc'd]W
UbX'hY'W'cbW'g]cbg'hYm'X'fUk "'7ca V]b]b['WU'fY'Z'c'VgYf] U]h]cb'k]h'g_]`Z' 'hUW'Z' 'ei Ygh]cbg'hc'
gi dYf]]gcf'g'UbX'ch'Y'f'Y'Ua 'a Ya VYfg'k]''VY'bYX'YX'h'fci [\ci h'hY']bhYfbg\]d''

Gh XYbh]g'UfY'YbW'ci fU[YX'hc'_Y'Yd'fY[i 'Uf'W'cb]h]W'ik]h'hY'f'5WUXYa]W7'cbj Ybcf'Z'cf[i]XUbW'Z'X]gW'gg]cb
cZk Um]g'hc'XYj Y'cd'h]g'UggYgga Ybh]UbX'Z'f'h]dg'cb'Z' f'hY'f'fYUX]b[''

Hi fb]h]b'gY'h]b[. H\]g'Ugg][ba Ybh]g'gi Va]hYX'h'fci [\ 'Hi fb]h]b'UbX'gh XYbh]g'W'Ub'gY'Y'Hi fb]h]b'g]a]Uf]m
fYdcf'g''

Gi Va]gg]cb 'cZ5ggYgga YbhiHUg_g

Hi fb]h]b 'Gi Va]gg]cb

≠Zmci 'YbWci bHYf'U'dfcV'Ya 'k \Yb'UHYa dh]b['hc'gi Va]hmc i f'Ugg][ba YbhiHfci [\ 'Hi fb]h]bž'd'YUgY
HY'Yd\cbY'9I HYfbU'Gi ddcfhcb'- ' ,) " ' ' %cf'Ya U] 'H'Ya 'cb'YI HYfbU'HY'ngi ddcfh4 i bgk "YXi "Ui "'Gi ddcfh
\ci fg'UfY' , .\$Ua '—%\$. \$\$da 'cb'k YY_XUmg'UbX'-. .\$Ua '—) . \$\$da 'cb'k YY_YbXg'fI *) 'XUmg'U'mYUfL" ≠Zmci
UfY'i bUV'Y'hc'gi Va]hmc i f'Ugg][ba YbhiXi Y'hc'U'Zi 'hk]H'Hi fb]h]b'mci 'a UmiUdd'mZcf'Ub'YI HYbg]cbž'Vi hmc i
a i ghfYHU]b'mci f'h]W_Yhbi a VYf'Zca '9I HYfbU'Gi ddcfhfU'cb['k]H'UbmicH'Yf'fY'Y] UbhXcW a YbfgL'hc

5 WUXYa]W< cbYgmiUbX'D`U[]Uf]ga

D`U[]Uf]ga]g'i]b['hY'k cfXg'cf]XYUg'cZcH.Yfg'UbX'dfYgYbh]b['hYa 'Ug'mci f'ck b" #WUb'fU_Y'a Ubm
Z'fa gZ'Zca 'XY'VYfUHY'WX.YU]b['hc'UW]XYbhU'mWcdm]b['Zca 'U'gci fW'k]h'ci hUW_bck 'YX[Ya Ybh'

I BGK '[fci dg'd`U[]Uf]ga]bhc'hY'Z`ck]b['WUHY[cf]Yg.

7 cdm]b[.i]g]b['hY'gUa Y'cf'j Yfmg]a]Uf'k cfXg'hc'hY'cf][]bU'hYi hcf'XYU'k]h'ci hUW_bck 'YX[]b['hY'
gci fW'cf'i]g]b['ei chU]cb'a Uf_g" 'H\]g'U'gc'Udd'Yg'hc]a U[YgZ'UfhUbX'XYg][b'dfc YWgZ'Ug'k Y''Ug
dfYgYbhU]cbg'k \YfY'gca YcbY'dfYgYbhg'Ubch.Yf'g]XYUg'cf'k cfXg'k]h'ci hWYX]h'

#Uddfcdf]UHY'dUfUd\UfUg]b[.7\Ub[]b['U'Zk'k cfXg'UbX'd\UfUg'k \]Y'a cghmfYU]b]b['hY'cf][]bU'
ghf' W'fY'UbX#f'dfc[fYgg]cb'cZ]XYUg'cZcH.Y'cf][]bU'z'UbX']bZ'fa U]cb'k]h'ci hUW_bck 'YX[Ya Ybh'H\]g'U'gc
Udd'Yg'g]b'dfYgYbhU]cbg'k \YfY'gca YcbY'dUfUd\UfUg'g'Ubch.Yf'g]XYUg'cf'k cfXg'k]h'ci hWYX]h'UbX'hc
d]YW]b['hc[Y'hYf'ei chYg'UbX'dUfUd\UfUg'g]bhc'U'bYk'k \c'Yz'k]h'ci hUddfcdf]UHY'fYZYfYbW]b["

7 c`i]g]cb.'k cf_]b['k]h'c'hYfg'Vi hdUgg]b['cZcH.Y'k cf_'Ug'U'dYfgcb'g']bX]j]Xi U'k cf_"7 c`i]g]cb'U'gc
]bWi XYg'dfcj]X]b['mci f'k cf_'hc'Ubch.Yf'g]h'XYbhVYZ'fY'hY'Xi Y'XUHY'z'cf'Z'f'hY'di fdcgY'cZcH.Ya
d`U[]Uf]g]b['UhUbmi]a Yz'dUm]b['Ubch.Yf'dYfgcb'hc'dYfZ'fa 'Ub'UWXYa]W]Ug_z'gh'U']b['cf'UW'e]f]b[
Ubch.Yf'dYfgcb'g'UWXYa]Wk cf_'UbX'Wcdm]b[]h'cZ'Zf]b['hc'W'e'a d'YHY'Ubch.Yf'dYfgcb'g'k cf_'cf'gYY_]b[
dUma YbhZ'f'W'e'a d'Y]b['UWXYa]Wk cf_"

#Uddfcdf]UHY'W]U]cb.'7]h]b['gci fW'g'k \]W\Uj Y'bhVYYb'fYUXz'k]h'ci hUW_bck 'YX[]b['hY''gYW'ebXUfm'
gci fW'Z'ca 'k \]W'_bck 'YX[Y'cZcH.Ya '\Ug'VYYb'c'fU]bYX"

8 i d']WU]cb'f'fY'Z'd`U[]Uf]ga 'E'gi Va]h]b['mci f'ck b'k cf_z]b'k \c'Y'cf]b'dUf'z'k \YfY'j'h\Ug'dfYj]ci g'm
VYYb'dfYdUfYX'cf'gi Va]hYX'Z'f'Ubch.Yf'UggYgga Ybhcf'W'e]f'gY'Uhi BGK 'cf'Ubch.Yf'i b]j Yfg]h'

7 cffYW'fYZYfYbW]b['dfUW]W]g.

- DUfUd\UfUg]b[žgi a a Uf]g]b[žYggUmk f]h]b['UbX'h]a Y'a UbU[Ya Ybh
- 5ddfcdf]UHY'i gY'cZUbX'Uhf]Vi h]cb'Z'f'U'fU]b[Y'cZa UHYf]U'g']bWi X]b['hYi hz]a U[YgZ'Z'fa i 'UY'UbX
W'ebW'dhg"

#X]j]Xi U'Ugg]ghU]bW']g'Uj U]UV'Y'cb'fYei YghZ'ca 'H\Y'@YUfb]b['7YbhY'f'f'hd.#k k k "Wi bgk "YXi "Ui #"
Gh XYbhg'UfY'U'gc'fYa]bXYX'hUhWfYz']h]a Y'a UbU[Ya Ybh]g'Ub]a dcfU]bhdUfhcZgh XmiUbX'cbY'cZcH.Y
]XYbh]ZYX'W]i gYg'cZd`U[]Uf]ga]g'dccf'h]a Y'a UbU[Ya Ybh'Gh XYbhg'g'lc'i 'X'U'ck'gi ZW]Ybh]h]a Y'Z'f
fYgYUfW'z'XfU]b['UbX'dfcdYf'fYZYfYbW]b['cZgci fW'g']b'dfYdUf]b['U''UggYgga Ybh]h]a g"

I BGK '@]VfUfmU'gc'\Ug'hY'9@G9'hc'Uj U]UV'Y'hc'Ugg]ghmci 'k]h'mci f'gh XmiUhi BGK "'9@G9']g
XYg][bYX'hc]bhcXi W'bYk'gh XYbhg'hc'gh X]b['Uhi BGK 'Vi h]hW]b'U'gc'VY'U'[fYUhfYZYg\Yf'Xi f]b['mci f

- i bXYfghUbx'mci f'f][\hg'UbX'fYgdcbg]V]h]Yg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[]Uf]ga ž'Wcdmf][\hžI BGK 'Gh XYbh7cXY'cZ7cbXi W'Ubx'5Ww'dhUV'Y'I gY'cZ I BGK '⇒H'F Ygci fW'g'Dc`]Wn
- VY'Uk UfY'cZh'Y'ghUbxUfXg'cZVY\Uj]ci f'YI dYW'X'cZYj Yfmcby`]b'h'Y'I BGK 'Wca a i b]m
- `cWJh'gYfj]Wg'UbX'j]bZcfa Uh]cb'UVci hl BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZh'YgY'UfYUg'k]`VY'ZJa]]Uf'hc'mci ž'ch'Yfg'k]`VY'byk "; U]b]b['U'gc`X'i bXYfghUbx]b['cZU`h'Y fY'UH'X'UgdYW'g'cZ9@G9'k]`Y'd'mci 'a U_Y'h'Y'a cghcZmci f'gh X]Yg'Uhl BGK ""

[\hhd.##ji V'YWf i \]XYg" \]VfUfm'i bgk "YXi "Ui #' \]gY#JVci h' \]gY](#)

5 WUXYa]WbZcfa Uh]cb

: cfYggYbh]U`gh XYbh]bZcfa Uh]cb fY`Uh]b[`tc.

- fYei Yghg`Zcf`YI H`bg]cb/
- `UhY`gi Va]gg]cbg`[i]XY`]bYg/
- fYj]Yk `cZa Uf_g/
- I BGK `<YU`h`UbX`GUZYmidc`]WYg/
- YI Ua]bUh]cb`dfcW`Xi fYg/
- gdYW]U`W`bg]XYfUh]cb`]b`hY`Yj Ybhcz]`bYgg`cf`a]gUXj Ybh fY/
- gh XYbhYei]mUbX`X]gUV`]m/
- UbX`c`hYf`YggYbh]U`UWUXYa]W]bZcfa Uh]cbz`gYY

[\ftdg.#k k k "Uftg"i bgk "YXi "Ui #W ffYbh\]gh XYbh\]UWUXYa \]W\]bZcfa Uh\]cb#dfchW`g`\[i \]XY`\]bYg#](#)

⇒ a U[Y`7 fYX]h

GmbYf[]Yg`]b`Gci bX`&\$%*`

7F ⇒ CG

7F ⇒ CG`Dfcj]XYf`7cXY.`\$\$\$- , ;

5W_bck`YX[Ya Ybhcz`7ci b]fm

K Y`UW_bck`YX[Y`hY`6YXY[U`dYcd`Y`k`c`UfY`hY`fUX]h]cbU`W`ghcX]Ubg`cZ`hY`UbXg`cb`k` \]W`I`BGK
? Ybg]b[hcb`W]a`di`g`]g`cW]hYX"