

=ba][fUM]i b 9gi X]UF



9gi X]UF ! ' i b]j Yfg]XUX

=b[`Åg

=k ci `X``_Y'hc`Ybfc```UhU'i b]j Yfg]lm!

=bX]WUf`ei Y`ei]YfYg'a Uf]W`UfHY

< Öb[Uf c

GnYfYtbÅ_`VY]fUh_crb]`Y[nYHYa fY"

=k Ubhrc`Udd`mZcf`SSSSSSSSSSSS`Vdi fgy"

=bX]WUf`ei Y`ei]YfYg'a Uf]W`UfHY`Yb`i bU`Ug][bUhi fU

GnYfYtbÅ_`Y`Ybh_Yrb]`SSSSSSSSSSSS`_ÅdnÅgfY"

Ub`i bXYf[fUXi UY

H]dc`XY`a UfÉW`U

U`Ud_ÅdnÅg

U`dcg] fUXi UY

H]dc`XY`a UfÉW`U

a`YghYf_ÅdnÅg

U`D\8

H]dc`XY`a UfÉW`U

D\8

U`Zi ``!h]a Y

H]dc`XY`a UfÉW`U

bUddU]`fU[crUhcg

U`dUfh]h]a Y

H]dc`XY`a UfÉW`U

f`Ågn]X`g

Ub`cb`]bY

H]dc`XY`a UfÉW`U

cb`]bY

=k ci `X``_Y'hc`9gi XmiUhmci f`i b]j Yfg]lmZcf
SSSSSSSSSSSS"

=bX]WUf`U`Xi fUM]i b`XY`hi `dYf]cXc`XY`]bhYfWla V]c

GnYfYtbÅ_`Uh`Y[nYHYa Yb`fUbi `b]`SSSSSSSSSSSS"

U`gYa YghYf

8`i fUM]i b`XY``U`YghubV]U`Yb``U`i b]j Yfg]XUX`XY`XYgh]bc

Y[`mgnYa YghYf

Ub`UWXYa]W`hYUf

8`i fUM]i b`XY``U`YghubV]U`Yb``U`i b]j Yfg]XUX`XY`XYgh]bc

Y[`mÅj

K `UhUFY`h`Y`k cf_`fYgf]W]cbgZcf`9gi XYbng3

=bZcfa UfHY`XY`Ug]fYgf]W]cbYg`UWcfU`Yg`dUfU`Ygi X]UbHYg

A]_`U`_cf`1/2cn]gc_`a`i`b_`1/2U`i`X]1/2c_`f`ÅgnÅfY3

=ba][fUM]i b 9gi X]Uf



8c'=\Uj Y'hc'g\ck 'Wtd]YgcZ'hY'cf][]bU'XcW'a Ybng
cf'hY'cf][]bU'XcW'a Ybng'hYa g'j Yg3
DfY[i b'uf'g] 'h]YbYgei Y'dfYgYb'uf'XcW'a Yb'ng'cf][]bU'Ygc'Z'hc'Wtd]Ug

9`A'z\U'Uh'Yf'YX'Yh]Xc_i a Ybh a c_'a 1/2c'U'h'ia i h'uca
V'zj U[m'Uh'Yf'YX'Yh]Xc_i a Ybh a c_'fU'Yg'igr0_gA' 3

K \U'UFY'h'Y'Yb'f'm'f'ei]fYa Yb'ng'cZ'h'Y'i b]j Yf'g]m3
DU'U'U'gc']V'h' X'XY'U'W'W'gc'U'U'i b]j Yf'g]XUX

A]_U'Z'j A'h']_G'Y'h'a A'bnY_'Uh'Y[m'h'Ya Yb3

5 fY'mei '[c]b['hc'g'Yb'X'a Y'U'Z'cfa U'c'Z'Yf3
DfY[i b'uf'g] 'f'Y'V]f'g'i b'U'W'f'U'X'Y'U'W'd'U'V] b

? ØX'YbY_'a U'X'\]j U'U'cg'U'Y'b'U'ch3

8cYg'h'Y'i b]j Yf'g]m[i i U'f'U'b'h'Y'U'W'W'a a cX'U]cb'Ug
k'Y'3
DfY[i b'uf'g] 'U'i b]j Yf'g]XUX'd'f'c'd'c'f'V]cb'U'U'c'U'a]Yb'hc

5n'Y[m'h'Ya 'V]r'hc'g'f'ig'1/2'1/2]g3

8cYg'h'Y'W'ei f'g'Y]b]j c'j Y'U'b]b'h'f'bg\]d'U'g'k'Y'3
DfY[i b'uf'g] 'h' d'U'b'X'Y'Y'g'h' X]c'g'W'eb'h'Ya d'U'd'Y'f]c'X'cg'X'Y'd'f'W]V]W'g'd'f'c'Z'g]cb'U'Y'g

5_i f'ri g[n'U'c'f'bc_]]X' g'n'U'c'h]g'a U['W'U'b'Z'c['U'3

=g'h'Y'f'Y'U'W'g'h'c'g'h' X'm'U'g'U'b'Y'i W'U'b[Y'g'h' X'Y'b'h'U'h
m'ei f'i b]j Yf'g]m3
DfY[i b'uf'g] 'h]Yb'Y'gei Y'd'U[U'f'U'a U'f'É'W'U'Y'b'U'i b]j Yf'g]XUX'X'Y'X'Y'g]bc

? Y'_'Uh'Y[m'h'Ya Yb'W'g'Y'Y'X]1/2_A'bh'U'b'X'É'U'h'Z]n'Y'b]3

<ck 'W'b'='f'U'W'_'h'Y'd'f'c[f'Y'gg'c'Z'a m'U'd'd']W'h]cb3
=b'Z'cfa U'f'Y'X'Y'W'a c'W'eb'g' 'h'f'Y'Y'g'h'U'X'c'X'Y'h' 'gc']V]h' X

< c[n'ub' 'h' X'ca 'b'nc'a cb'_G' Y'h] U'Y'Y'b'h_Y'n'Á'g'Ya 3

K \U'UFY'h'Y'O'U'b[i U[Y'Q'U'b[i U[Y'f'Y'ei]fYa Yb'ng3
=b'Z'cfa U'f'Y'X'Y' 'b]j Y'X'Y']X]ca U'b'W'W'g'U'f]c'd'U'f'U'g'Y'f'U'W'd'U'X'c'Y'b'U'i b]j Yf'g]XUX

A]_U'U'Om'Y'j C'bn'Y'j]_G'Y'h'a A'bnY_'3

K \U'h]g'h'Y'S'S'S'S'S'S'S'S'S'g'm'g'h'Ya '']_Y3
DYX]f']b'Z'cfa U'W] b'gc'V'f'Y'Y'g]g'h'Ya U

A]n'Y'b'U'S'S'S'S'S'S'S'S'S'f'Y'b'X'g'n'Y'f'3

W'Y'X]h
H]dc'X'Y'g]g'h'Ya U

_f'Y'X]h

a U'f_]b[
H]dc'X'Y'g]g'h'Ya U

c'g'h'1/2'n'm]g]

8c'=[Y'h'U'b'U'W'X'Ya]W'f'U'bg'W]d'h'U'h'Y'Y'b'X'c'Z'a m
Y'i W'U'b[Y3
DfY[i b'uf'g] 'f'Y'V]f'g'i b'U'W'ed]U'X'Y'h' 'Y'i d'Y'X]Y'b'h'U'W'X'Á'a]W'É'U'Z]b'U'X'Y'U'Y'g'h'U'b'V]U

? U'd'c_'h' X'ca 1/2'nc'g'1/2'f'U'ch'U'W'g'Y'Y'j A' A'b3

=ba][fUM]i b 9gi X]Uf

K \Uh]g'h.Y'hUW]b['gmY''_Y3 DYX]f']bZcfa U]i b'gcVfY'Y 'Ygj`c'XY'YbgYl UbnU	A]'nYb'U'HubE]V]g]Ei gU3
5 fY'h.YfY'SSSSSSSSSSSSS'3 DYX]f']bZcfa U]i b'gcVfY'Y 'Ygj`c'XY'YbgYl UbnU	J UbbU_SSSSSSSSSSSSS3
`Wn fYg H]dc'XY'WUgY	Y UX]gc_
gYa]bUfg H]dc'XY'WUgY	gnYa]b]E]i a c_
h hcf]Ug H]dc'XY'WUgY	c_hU]]i f 1/2
VbZYfYbWg H]dc'XY'WUgY	_cbZYfYbV]1/2
K \UhVei fgYg'UFY'cZYZFX'Vmgj a a Yf'gWcc`g3 DFY[i b]Uf'dcf''U'cZYf]U'XY'W]fgcg'XY''U'YgWY'U'XY'j YfUbc	A]'nYb'_i fri gc_Uh_Eb]bU_'Ubm]E]Y[nYhYa Y_3
K \Yb'UFY'h.Y'Yi La g'Y'X3 DFY[i b]Uf'dcf''Y'dYf]cXc'XY'Yi 1/2 YbYg	A]_cf'j UbbU_'Uj]ng] 1/2 3
K \YfY'Wb'='Z]bX']bZcfa Uh]cb'Uci hU''h.Y'Ve] fgYg Uj U]'W'Y3 DFY[i b]Uf'Xi bXY'Ve]bgY[i]f']bZcfa U]i b'gcVfY''Ug]Ug][b]hi fUg	< c' hU]1/2c_ V j YW']bZcfa W]i hU'_i fri gc_fi `3
=g'h.YfY'U'i b]j Yfg]mgdcfng'Wb]Yf3 DFY[i b]Uf'g]'U'i b]j Yfg]XUX'W'Yb]U'Ve]b']bg]U'U]cbYg'XYdcf]j Uj	J Ub'Uh'Y[nYhYa Yb'gdcfh_Öndcb]3
< ck 'Wb'='c]b'gi XYbhgc'W]h]Yg3 DFY[i b]Uf'W'a c i b]fgY'U''Ug]Ugc'V]U]cbYg'XY'Ygi X]Ub]Yg	< c[nub'hi Xc_'X]1/2Y[mYg'YhY'\YnV]U]U_crb]3
K \UhUFY'h.Y'Yg]a U]X''j]b['Vc]g]b'U]m]3 DYX]f']bZcfa U]i b'gcVfY'Y 'Vc]h'XY''Uj]XUYb''U'V]i XUX	A]_ 'Ua Y[Å'\Yn]g]'_Öng]Y_'Q'1/2cg]U]b]3

9gi X]Uf ! '7i fgcg'XY']X]ca Ug =b[`Ag

< Öb[Ufc

=ba][fUM]i b 9gi X]Uf

K \Uhi`Ub[i U] YgVWb`=gi XmiUhmci f'gWcc`3
=bZcfa UfhY`XY`cg]X]ca Ugei Y'gy'di YXYb`Yghi X]Uf`Yb`Y`Wbhf

A]nYb`bmYj Y_Yhhi Xc_]HhUbi `b]3

=g]hYfY`Ud`UWa YbhiYghhc`UggYgg'a m`Yj Y`3
DfY[i b]Uf`g]`Yi]ghYb`dfi YVUg`XY`b]j`Y`

J Ub`g]b]hZY`a Af` `hYgh3

7Ub`=fUbgZYf`hc`UbchYf`Yj`Y`]ZH`Y`cbY`=La
UfhYbX]b[]g]bchf][\hZcf`a Y3
DfY[i b]Uf`g]`Yg]dcg]V`Y`Wla V]Ufgy`XY`b]j`Y` Yb`WUgc`XY`bc`YghUf`V`b]h]b]c

J 1/2h`Urc`_g]b]hYz`U`Uhz`Ua]VY`a cgh`Y`fc`_bYa
a Y[ZY`Y`3

8c`mci `Uj`Y`U`XYhU]`YX`XYgW]d]h]cb`cZH`Y`W`i fgY3
DfY[i b]Uf`g]`Yi]ghYb`XYgW]d]h]cbYg`XYhU`UXUg`XY`Ug]Ug][b]hi fUg

? Ud`U`UbA`_V`j`W`W`h`A`_c`r`U`h`g]h`U`b`m`Y`j`h`U`b`z`c`n`t`a`f`i``3

K \Uhi]g]hY`a U]a i a `bi a VYf`cZ]gh`XYb]g]b`U
WUgg3
DfY[i b]Uf`dcf`Y`a`1/2]a`c`b`Ca`Yfc`XY`Yghi`X]Ub]h]g]Yb`W`XU`W`UgY

A U]a i a `1/2`b`n`b`Y`U`h`U`_`Y[m]Ug]dcf`h]U3

K \UhiZUW]h]Yg]UfY`h`YfY]b`mci f'gWcc`3
DfY[i b]Uf`dcf`Ug]b]g]U`U]cbYg`XY`W`bhf

A]nYb`Y`Yh`gA[Y`_j`UbbU`_`h]g]c`1/2]U3

8c`mci `Ugc`UffUb[Y`Yi W]fg]cbg3
DfY[i b]Uf`g]`Y`W`bhf`cf[Ub]nU`Yi W]fg]cbYg

?]f`1/2Xi` `1/2gc`_`h]g]gnYfj`YrbY`_3

K \Uhidfc[fUa`g]Xc`mci `cZ]Yf3
=bZcfa UfhY`gcVfY`cg]dfc[fUa`Ugei Y'gy`cZ]Yf]Ub

A]nYb`dfc[fUa`c`_`UhibnO`h]U`_3

9gi X]Uf`!`6WUg

=b[`Ag
=La `YfY`hc`]bei]fY`U`ci`hZ`bX]b[`cddcf]i`b]h]Yg'
DYX]f`]bZcfa`UW]i`b`gcVfY`Z]bUbV]UW]i`b`

< Ob[Ufc
5`Z]bUbgn]fc]n]g]`Y`Yh`gA[Y`_f` `gnYf`Y`bA`_`Af`XY`_`Xb]`"

K \]W`VcX]Yg]Wb`Z`bX`a`mgi`X]Yg3
DfY[i b]Uf`ei`A`cf[Ub]ga`cg]di`YXYb`Z]bUbV]Uf`h`i`g`Yghi`X]cg

A`Y`m]`_`gnYfj`Y`nYh`_`Z]bUbgn]fc]n`U`h`1/2`_`U`
h]bi`_`a`1/2`n]t]a`U`h3

=bYX`Z]bUbV]U` `Y`d`Zc`"SSSSSSSSSSSS"
=bX]W]f`ei`Y`b`Y`W]g]h]U]h`i`XU`Z]bUbV]YfU

GnO`_`gA[Ya`_`j`Ub`UbntU[]`h]a`c[U]h]g]U`SSSSSSSSSSSS"

=ba][fUM]i b 9gi X]Uf

hi]hcb'ZYyg
5ei Y`c'dUfU`c'ei Y'bYWG]hUg'Uhi XU'Z]bUbV]YfU

HUbXÉ^

a m`]j]b[`Yl dYbgYg
5ei Y`c'dUfU`c'ei Y'bYWG]hUg'Uhi XU'Z]bUbV]YfU

a Y[Á\YhÁg]_ÒhgÁ[Y_

W]`XWfY
5ei Y`c'dUfU`c'ei Y'bYWG]hUg'Uhi XU'Z]bUbV]YfU

[mYfa Y_Y`Vb/g

K \Uhi_]bXg'cZgWc`Ufg\]dgUFY'Uj U]`UWY3
DYX]f`]bZcfa U]i b'gcVfY`VWwlg

A]mYb`ÒgrhÒbXÉU_ YÁ\Yh Y_3

9gi X]Uf ! `7 cbj U]XUM]i b`XY'hfi `cgYl hfUb`Yf cg =b[`Ág

=k ci `X`_]Y'hc'j U]XUW'a miXY[fYY`Wfh]Z]W]hY`]b
Q]zi bhfnQ
=bX]Wf`ei Y`ei]YfYgV`bj U]XUf`hi `hfi `c`UW]XÁa]V`Yb`Y`dUÉgXY`XYg]bc

< Öb[Uf c

GnYfYhbÁa `Y Zc[UXhUhb]`UX]d`ca 1/a `Qfgn]½VUbQ

8c`mci `Uj Y`U`]ghicZ`h`Y`Wfh]Z]YX`hfUbg`Urcfg]b
Oub[i U] YQ3
DYX]f`i bU`]gU`XY`hLUi V`cYfYg`f`fUXcg`Yb`Y`Yb[i UY`V`ffYgdc]cbX]Yb]hY

J Ub`]gU`]hY`Yg`QmY`j OZcfXÉi `fi `3

K \YfY`Vub`=[YhU`Wfh]Z]W]hY`cZYei]j UYbW]B
DfY[i b]Uf`Xi bXY`V`bgY[i]f`i b`Wfh]Z]W]Xc`XY`V`bj U]XUM]i b

< c`_Ud\Urc_] [Urc`YghUff`i `ž\c[mY]ga YfhÁ_ U
X]d`ca 1/a 3