



"

"



# VCDNG'QH'E QP VGP VU'

" " " " " " " " " " Rci g"  
"

Qxgtxkgy "/////////////////////////////////////"3"  
 Rwr qug"/////////////////////////////////////"3"  
 Vtcxgn'Ucwwu"/////////////////////////////////////"3"  
 Qeewr cvkqpcn'Htcf "/////////////////////////////////////"3"  
 Gzegr vkpu"/////////////////////////////////////"4"  
 Go r m{ gg'Tgur qpuklksku"/////////////////////////////////////"5"  
 Uwr gtxkuqtu'Tgur qpuklksku"/////////////////////////////////////"6"  
 Ceeqwpvu' Rc { cdrg'Tgur qpuklksku"/////////////////////////////////////"6"/"7"  
 Gki kdr'Gzr gpugu'Tgrv'gf 'vq'Vtcxgn'/////////////////////////////////////"7"  
 Kgrki kdr'Gzr gpugu'Tgrv'gf 'vq'Vtcxgn'/////////////////////////////////////"8"  
 Tgegr vu'/////////////////////////////////////"8"/"9"  
 Ecuj 'Cf xcpegu'/////////////////////////////////////" : "  
 Ckrkpg'Ugtxlegu'/////////////////////////////////////" : "  
 Fgpkf 'Dqctf kpi 'Eqo r gpucvkpp'/////////////////////////////////////" : "  
 Wpwugf IXqkf gf 'Vlengvu'/////////////////////////////////////" : "  
 Ckrkpg'Rgpcn' 'Hctgu'/////////////////////////////////////" : "  
 Hgs wgpv'Hn'gt 'Rtqi tco 'Cy ctf u'/////////////////////////////////////" ; "  
 Tgpvcn'Ectu'/////////////////////////////////////" ; "  
 I tqwvf 'Vtcur qtvcvkpp'/////////////////////////////////////"32"  
 Wug'qh'Rgtuqpcn' Cwqo qdkg'/////////////////////////////////////"32"  
 J qvgn'/////////////////////////////////////"32"

"



# Q

"

Vj ku'vtcxgnRtqegf wtgu'O cpwcn'r r rkgu'vq'cmIcemuqp'Rwdrke'Uej qqnu'go r rj{ ggu'y j q"  
kpwet" gZR gpugu" y j kg" gpi ci gf "kp" qhlekcn' uej qqni' f kwtlev" dwukpguuO " Qpn{ " vj qug"  
gZR gpugu" vj cv'j cxg" dggp" kpewtg " y j kg" qp" F kwtlev" dwukpguu" y km'dg" tsko dwtugf O"  
F kwtlev" vtcxgn' cpf " dwukpguu" gZR gpug" tsko dwtugo gpv' r tqegf wtgu" o ggV' vj g" KTU"  
f ghkpkqp" qh'tsko dwtudng" gZR gpugO" GZR gpugu" vj cv'eqphqto " vj" vj ku'r qre{ " ctg" pqv"  
tgr qtvgf " cu" vzcdrng" kpego g" vq" vj g" kpf kxf wcnO" Egtvcp" gZR gpf kwtgu" vj cv' f q" pqv"  
eqphqto " vj" vj ku'r qre{ " y km'pqv'dg" eqpukf gtgf " tsko dwtudngO" Kgo u" qh'c" r gtuqcn"  
pcwtg" kpewtg " y j kg" vtcxgn'pi " uij cm'dg" ectghwm{ " ugi tgi cvgf " d{ " vj g" vtcxgn" tgo " "  
F kwtlev' gZR gpugu' cpf " ctg" pqv' tsko dwtudngO'

"

Cm'vtcxgnrtgrvgf " gZR gpugu'o wuv'dg'o cf g'y ky kp' vj g'gy kcn'cpf " hgi cnlko ku'cu'f ghkpgf "  
d{ " F kwtlev. " ucwv' cpf " hgf gten' wk gnpgu' cpf " tgi wcvkpuO "

"

"

# R

"

Vj g'r wtr qug' qh'v' ku'o cpwcn' ku'v' r tqxkf g' dtqcf " i wk gnpgu' hgt " qhlekcn' Lcemuqp' Rwdrke "  
Uej qqnu' dwukpguu" vtcxgn' kp" ceeqtf cpeg" y ky " cr r rkecdng" tgi wcvkpu" cpf " uqwpf "  
dwukpguu' r tcevkeguO'

"

f g	f _	gHg v
Cp" go r rj{ gg" ku" pqv' kp" vtcxgn' ucwv" y j gp" vtcxgn' pi " kp" vj g' vk' eqwpv{ " ctgc" *J kpf u. "		
O cf kut	"	

"

G

"

Vj g"Dqctf "qh"Vt wuygggu"cpf "yj g"Uwr gtlpvpgpf gpv"qh"Uej qqnu"qt "yj gkt"f guki pgggu"j cxg"



o Qp'Hkg'y kj 'Ceeqpwu'Rc{cdrg'F gr ctwo gpv'cp'wr f cvgf "cwj qtk cvkqp"fk gev'f gr quk'kphq"

"

"

Kpf kxf wcu" cwj qtk gf " vq" cr r tqxg" vtcxgn' qt" dwukpguu" gzi gpf kwtgu" qh' qvj gt" go r m{ ggu" uj cm'  
cf o kprgt"yj gug"i wk grkpgu0"Gzr gpugu"yj cv'cr r gct"vq"dg"gzegulkxg"qt"wpwucn'kp"tgr vkqp"vq"yj g"  
pcwtg"qh'j g"dwukpguu"vtcxgn'uj cm'dg"kpuguki cvgf "r tkqt"vq"cr r tqxcrl0"Gzr rpevkqp"qh'cp{ "uwej "  
gzi gpf kwtg'o wuv'dg'kpenw gf "dghqtg'uwdol kuukqp"vq'Ceeqpwu'Rc{cdrg0'



"

Vj g'Ceeqpwu"Rc{cdrg"uchh"ku'tgur qpukdrg"hqf"tgxky kpi "cm'er r tqxgf "tcxgn/tgrvqf "tgs wguu"cpf "

Ect "tgpvcn'cpf "i cuqrlpg" hqt "tgpvcn'xgj kengu=" "o krci g'tgko dwtugf "y kj "c"tgpvcn'cu'o krgu"  
ctg'htgg0'

"

I tqwpf "tcpur qtvcvkqp" kpenf kpi "vzk'cpf "r vdrke "tcpur qtvcvkqp" hctgu."o krci g'hqt "r gtuqpen"  
xgj kengu."cpf "r ctntkpi "hgg0'

"

O gcu'y j krg"qp" qhhekn'IRU" dwukpguu'y kj "qxgtpl j v'j qvgn'usc {0"IRU" f qgu"pqv"tgko dwtug"  
vzcdrg"o gcuô o gcu'hqt "f c{ "vtcxgr'qpn{0'

"

Tgi kwtcvkqp"cpf "hggu'hqt" cwgpfcpeg"cv'cr r tqxgf "eqphgtgpegu"cpf "ugo kpcutu0'

"

Vczgu'cuuqekcvf "y kj "tcpur qtvcvkqp." hqi kpi "cpf "o gcu"qpn{0'

"

Vtcxgr'vq"cpf "htqo "ckr qtvecrwrwvf "cv'y g'tcvgr gt"o krg"guwcdkuj gf "d{ "y g'F gr v'qh'Hkpcpeg"





Y j gtg"vj g"go r m{ gg"ku'tgs wktgf "vq"i q"cf c{ "gctn{ "vq"s wcrkv{ "hqt"cmjy /r tkegf "r gpcn{ "ckhctg."vj g"  
ucv'g'y knr c{ "vj g'cf f kkpncn'nf i kpi "cpf "o gcn'gZR gpugu'pqv'vq'gzeggf "vj g'co qwpv'qh'ucxkpi u'kp"vj g"  
ckhctg0

"

"

"

Cp{ "dqpwu'qt"r tqo qv'kpcn'i tcwkv{ "tgegkxgf "cu"ci tcwkv{ "cu"ci tguwn'qh'qh'heknLRU"vcxgn'uj cni'dg"  
wugf "vq"qh'ugv'qt"tgf weg'vj g'equv'qh'uwdugs wgpv'qh'heknLRU"vcxgn0"wpf gt "pq'ektewo ucpegu'ecp"vj g"  
vcxgrgt"nggr "c" dqpwu'qt"qvj gt"r tqo qv'kpcn'i tcwkv{ "uq" gctpgf "hqt"j ku"qy p"r gtuqpcn'wug0"Cu"  
u'hekgpv'o krci g."gctpgf "cu"ci tguwn'qh'ucv'g/r ckl "vcxgn"ku'ceewo wrcv'g. "hgg"v'kengv'eqwr qpu'y kn'  
dg"cr r kcf "hqt"cpf "wugf "vq"qh'ugv'qh'heknLRU"vcxgn'equu0"

"

"

"

Vj g" F kurtlev"j cu"gpvgtgf "kpvc"ceqvtcev'y kj "Gpvt r tkug" T gpvcn0Rtkqt "vq"tgpv'kpi "c"xgj keng."r rgcug"  
ecni' Ceeqwpw" Rc{ cdrig" Vtcxgn' Cpcn{ uv' cv' 823/; 82/: : ; ; "qt" 823/; 82/: 9: 5"CR" Uwr gtxkuqt" hqt"  
cuukucpeg0Vj g" F kurtlev'y kn'tgko dwtug"vcxgrgtu'hqt"vj g'equv'qh'tgpv'kpi "c"o kf/uk' g."kpvto gf kcv'g"qt"  
eqo rcev' ect" y kj " rtkqt" cr r tqxcr0 Vj g" Ucv'g" qh' O U" j cu" f kucqwpv' tcv'gu" cxckrdrg"  
\*y y y f h c 0 u c v g 0 u 0 u l r w e j c u k p i h t c x g n 0 0 krci g"ku'pqv'tgko dwtugf "hqt"tgpvcn'xgj keng."cnj qwi j "  
vj g'equv'qh'i cuqkpg'o c{ "dg"t'gko dwtugf 0

"

Vtcxgrgtu'uj qwf "tgpv'ect"vq"vj gkt "f gukpcv'kpv'y j gp"ftkxkpi "ku"o qtg'equv'gh'gevkxg'vj cp"qvj gt"  
o gcpu'qh'v'cpur qtvcv'kpv0

"

Y j gp" r kenkpi "w" c" tgpvcn' ect." vtcxgrgt" uj qwf "ej gen' y kj " tgpvcn' ect" ci gpv' hqt" cp{ "  
r tqo qv'kpcn'tcv'gu. "rcuv'o kpwg"ur gekcu. "qt" hgg"wr i tcf gu0

"

Vj g'r j { ulecn'eqpf kkp'qh'vj g'tgpvcn'xgj keng'uj qwf "dg"kpur gev'g'f r tkqt "vq"rgcxkpi "vj g'tgpvcn'  
m'0" Cp{ "f co ci g" hqwpf "uj qwf "dg"tgr qtvgf "vq"vj g"ect"tgpvcn'ci gpe{ "dghqtg"vj g'xgj keng"ku"  
ceegr v'g'0" F co ci g"uj qwf "dg"fqewo gpv'g' "qp"vj g"ect"tgpvcn'ci tgg'o gpv'vq"cxqkf "r quukdrig"  
f kur wg'qxgt" f co ci gu'hqt"y j kej "vj g'eqo r cp{ "ku'pqv'tgur qpukdrig0

"

Qt ki kpcn'tgpvcn'tgegr w'cpf "cp{ "cuuqekcv'g'f i cuqkpg'tgegr w'o wuv'dg'uwdo kv'g'f "y kj "vcxgn'  
t'gko dwtugo gpv'tgs wgu0

"

Go r m{ gg" y kn' pqv' dg" t'gko dwtugf "hqt" v'ch'le" ekc'v'kpu" vj g{ "tgegkxg" y j krg" qp" F kurtlev"  
dwukpu0

"

Vtcxgrgtu'ctg'tgur qpukdrig'hqt"ecpegrkpi "tgpvcn'ect"t'gugtxcv'kpv'kh'vcxgn'r n'pu'ej cpi g0

"

Qpn{ "LRU"go r m{ ggu'ctg"cmjy gf "vq"tkf g"cu"ci r cuugpi gt "cpf lqt" f tkxg'vj gug'f kurtlev'tgpvcn0

"

"

"

Vczk'dwu.'lwdy c{.'qt'uj wwrng'htgu'y kn'dg'tgko dwtugf 'cv'cewcn'equv'y kj 'qtki kpcn't gegkr uo'T gegkr u"  
uj qwf "kpenf g"eqo r cp{ "pco g.'f cvg.'f gukpcv'kp"cpf "co qwp0"Go r m{ ggu'vcxgn'kpi "v'j g"uco g"  
mcecv'kp'uj qwf 'uj ctg'i tqw'f 't'cpur qt'cv'kp"v'j"cpf 'htqo 'v'j g'ckr qt'v'y j gpgxgt'r quukdng0'

"

Nqecr'ect'ugt'xlegu'o c{ 'dg'wugf 'h'h'ku'v'j g'o quv'geqpqo kecn'htqo 'qh't'cpur qt'cv'kp0'

"

Nko qwukp'g'qt'ect'ugt'xlegu'uj qwf 'dg'wugf "qpn{ 'y j gp"clwuk'kcdng.'xcrkf "dwukp'guu't'gcuqpu'r tgenf g"  
v'j g'wug'qh'o qtg'geqpqo kecn'o qf g'qh't'cpur qt'cv'kp0'

"

Ceeqwpw'Rc{ cdrng'y kn't'gugtxg'Uj wwrng'Ugt'xlegu'v'j"cpf 'htqo 'v'j g'ckr qt'v'y j gp'tgs wgu0'

"

"

C'r tkxcvgn{ "qy pgf "xgj leng"o c{ "dg'wugf "hqt'dwukp'guu'vcxgn'r tqxkf gf "v'j g'xgj leng'ku'kpuwt'gf "d{ "v'j g"  
r tkxcv'g'qy pgt'cpf "v'j g'kpf kxf wcn'wukpi 'uwej "c'xgj leng'j cu'c'xcrkf "qr gtcvqt'at'kegpug0'k'ku'gzr tguun{ "  
w'p'f gtuqqf "v'j cv'y j krg'wukpi "c'r tkxcvgn{ "qy pgf "xgj leng.'v'j g'qr gtcvqt'cuuwo gu'cm't'gur qpukdkv{ 'hqt"  
ceekf gpw'v'j g'gzv'p'v'qh'v'j g'qr gtcvqt'at'kpuwt'cpeg"eqxgtci g0'

"

Vj g'F knt'lev'y kn'r c{ "c'ucpf ctf 'tcv'g'r gt"o krg'hqt'qh'hekn'vcxgn'd{ 'r tkxcv'g'cwqo qdkrg'dcugf "qp'v'j g"  
cewcn' \_\_\_\_\_ " " W'p'f gt" p'qto cn'  
ektewo ucpegu."o krgci g'ku'eqo r wgf "htqo "v'j g"vcxgn'gt'at'p'qto cn'y qtmukg"v'j g'f gukpcv'kp"cpf "  
t'gwtp"v'j g'vcxgn'gt'at'p'qto cn'y qtmukg"\*gzemf kpi 'y gng'p'f "vcxgn0'

"

Ewt'g'p'w'f.'t'gko dwtugo gpv'ht'k'p/f knt'lev'vcxgn'ku'cv'v'j g'tcv'g'qh'089'egpu'r gt'o krg'cu'qh'42460"Qw  
qh'v'qy p'vcxgn'ku't'gko dwtugf 'cv'v'j g'tcv'g'qh'043'egp'v'gtu'r gt'o krg'cu'qh'42460"Vj gug'tcv'gu'y kn'cf lwu'  
cu'v'j g'hgf gtcn'i qxgtpo gpv'cf lwu'ku'tcv'g.'v'j r kecn'f 'v'j g'h'ku'v'qh'v'j g'ecng'p'f ct" { gct0'

"

Y j gp"y q"qt"o qtg'LRU"go r m{ ggu'vcxgn'k'p"qpg'r tkxcv'g'xgj leng."qpn{ "qpg"vcxgn'gzr gpug"cv'v'j g"  
cwj qtk'gf "t'gko dwtugo gpv'tcv'g'r gt"o krg'uj cm'dg'cm'y gf 0"Vj g'r gtuqp"er'ko kpi "t'gko dwtugo gpv'  
uj cm't'gr qt'v'v'j g'pco gu'qh'q'v'j gt'LRU"go r m{ gg'r cuugpi gtu0'

"

Go r m{ ggu'o c{ "pqv'tgs wguv't'gko dwtugo gpv'ht'i cuq'k'p'g'cu'v'j ku'ku'eqxgt'gf "d{ "v'j g'o krgci g'tcv'g0'

"

Vtcxgn'gtu'wukpi "c'r tkxcvgn{ "qy pgf "xgj leng"v'j"vcxgn'q'w'qh'ucv'g'qp"qh'hekn'LRU'dwukp'guu'y kn'dg"  
t'gko dwtugf "o krgci g'cv'v'j g'o quv'geqpqo kecn'o qf g'qh't'cpur qt'cv'kp"/'p'qto cm{ "v'j g'm'y guv'ck'ht'g0"  
C'er t

"

Go r m{ ggu'uj qwf "cny c{ u'ugrgev'c"j qvgn'vj cv'ku'vj g'o quv'geqpqo kcn'hqt "vj gk "dwukpguu'tkr "kh'k'ku" pqv'qpg'qh'vj g'r tghgtgf "j qvgn0

"

Y j gp "tcxgnkpi "vq" c" eqphgtgpeg" qt "ugo kpct. "k'ku" cr r tqr tkvg" vq" uc { "cv'vj g"j qvgn'j quv'kpi "vj g" eqphgtgpeg" qt "ugo kpct. "cuuwo kpi "vj cv'vj g'f ckn { "tcvg'ku'p'qv'wpt gcuqpcdn { "gZR gpukxg' tgrv'kxg' vq" qvj gt " cngtpev'kxgu0

"

Qt "kh'cp" go r m{ gg"ej qug"vq"uc { "y kj "tgrv'kxgu. "j g"qt "uj g'y km'dg" t'gko dwtugf "hqt" o gcu'dw" o wuv" j cxg'r tkqt "cr r tqxch'htqo "uwr gtxkuqt "cpf "cwcej "c"eqr { "vq"tcxgn'tgko dwtugo gpv'tgs wgu0

"

Cm'hqi kpi "tgegkr v'ctg" tgs vktgf "r tkqt "vq" t'gko dwtugo gpv'dgkpi "r tqeguugf 0" O gcu"cpf "kpekf gpv'cu" qp'hqi kpi "tgegkr v'bo wuv'dg'kgo k gf "ugr ctcvgn { 0" C'hqi kpi "tgegkr v'bo wuv'kpenw'f g'cm'qhi'vj g'hqmy kpi " kphqto cvkqp<

"

P co g'cpf "h'ecv'kqp"qh'vj g'hqi kpi "guv'cdkuj o gpv"  
F cvgu"qh'uc { "  
Kgo k gf "ej cti gu'hqt'hqi kpi . "o gcu. "vgrgr j qpg"ecm. "kp/tqqo "o qxkgu. "gve0

"

Go r m{ ggu"ctg" gpeqwtci gf "vq" wug"vj gk "qy p" egn'r j qpgu" hqt "cm'ecm0" Vtcxgn'gtu"ctg" f'kueqwtci gf " htqo "wukpi "r j qpgu"kp"vj gk "j qvgn'tqqo u. "gzegr v'kp" ecugu"qh'go gti gpe { 0" "Cf o kpkutcvqtu"y j q"ctg"

f lgo 'f gr gpf u'qp'vj g'qecvqp'qh'vj g'vcxgr0'Vj g'F kvtevd'cugu'vj gk'cmqy cdng'r gt'f lgo 'tcvg'  
qp'vj g'tcvg'ugv'd{ 'vj g'F gr v0qh'Flpcpeg'cpf 'Cf o kvtevd'cugu'cpf 'Hgf gten'Tgi kvgt0'

"

"

Go r m{ ggu'ctg"

0"C'vcxgrgt"o c{ 'pqv'uwdo kv'c'r gt"

f lgo 'tgs wguv'ht'c'o gcn'kh'j kulj gt'o gcn'y cu'kpenwf gf 'kp'c'i tqwr 'dkn'r ckf "d{ 'cpqj gt'ci gpe{0'"

"

I tcwkvku"



Ki'vj gtg"ctg"cp{ "s wgu'kqpu"cu"vq"y j gvj gt"cp"gzr gpug"ku"cr r tqr tlcvg."kps wkt g"dghqtg"vj g"gxgpv'tcyj gt"  
vj cp"chgt0'

"

"

"

P qp/vtcxgrntgrcvgf "gzr gpugu'kpewttgf "f wtkpi "vtcxgrny kn'pqv'dg'tgko dwtugf "d{ 'vj g'F kutle0'

"

Tgvcknr' wtej cugu'qh'lw r rkgu."dqqu."gve0'

Gzr gpugu'kpewttgf "qp'dgi crh'qh'qyj gtu0'

"

"

"

Ki'qwj cxg'vtcxgrntgrcvgf "s wgu'kqpu."{qw'b c{ 'eqpcev'r gtuqpu'kugf "dgrqy "f wtkpi 'pqto cr'ndwukpguu"  
j qwtu<'

Ceeqwpw'Rc{ cdrg'uvch'o go dgt"

Gzgewkxg'F ktgevq't'qh'Hkpcpeg"

Ej kgh'Qr gtcv'kpi "Qhlegt"

"

Vtcxgrnt'uj qwf "dg'r tgr ctgf "vq"j cpf rg"cp{ "go gti gpekgu'qeewttkpi "y j kg'vtcxgrkpi "chgt"vj g'pqto cr'  
IRU'y qtnj qwtu0'P qvkh{ 'vj g'Ceeqwpw'Rc{ cdrg'uvch'vj g'pgz'v'dwukpguu'f c{ 'hqt'cuukvcpeg'k'p'tguqk'kpi "  
IRU'vtcxgr'n #

50 VtcxgrIT gko dwtugo gpv'Tgs wguv'ó'wugf "vq'tgs wguv't gko dwtugo gpv'hqf "vtcxgn'tgrcvgf "gzi gpugu"  
chgt'eqo r ngvqp"qh'vkr 0'

60 Kp/F kxtkev'O krci g"ó'wugf "vq'tgs wguv'o krci g'tgko dwtugo gpv'hqf "vtcxgn'y kj kp'y g'o gvtq"  
ctgc'y j gp'wulpi "c'r gtuqpcn'xgj kerg0'

"

6+ K'vcxgn'cttcpi go gpa'ctg'ej cpi gf "dgecwug'qh'c"pqp/F kutlev'tgrvgf "gxgpv."y g'vcxgrgt'y km'dg"  
tgr qpukdg" hqt" tgo dwtukpi " yj g" F kutlev' hqt" cp{ " equv' cpf " hggv" cuqekcygf " y kj " yj gkt"  
rtgr c{o gpa0"Cp{ "ej cpi gu"yj cv'tguwv"kp"cf fkkqpcn'hggv"o wuv'dg"cr r tqxgf "d{ "yj g"hwf kpi "  
uqwtg"cpf "yj g"vcxgrgtai"uwrtxluqt0" Y j gp" yj g" f kutlevai"ecpegrv'kqp" r tgeguugu"ctg"pqv"  
hqmqy gf ."yj gp"cp{ "equv'kpewtgf "dgeqo gu'vj g'tgr qpukdkv{ "qh'vj g'vcxgrgt0'

7+

"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"  
"

