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bjbj'2'2 7œ EX EX 7b o *
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 ,J *G f *G ,J €
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[< *~*V9hnc 0^md-*[‡YsY N Rb_ _gk*%lQ*~
 0

$$,\{1\ 8\ ag^*c^*N,,v^*bJT$$

$$^*_{\sim}^*V,,v\ R!k^*bJT$$

$$R/efe^*X\{v^*$$

$$^*vU_{-}$$

$$u^{\sim}!k$$

4
6
7
9
9
1 0

2 4
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2 6
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$$3 \ 0$$

$$3 \ 1$$

$$3 \ 1$$

$$3 \ 3$$

$$\wedge \ \check{S}$$

$$,\{ \ N^* \ \ R$$

ÿ,i*

R/efe*X{v((*V*[ÆT*N*S

*~Nm

*[*lÆT?eœ^

Y t*O*r*NCgHh*N,,v*l<_

z ^

VE-NCglQ~ÆT R/efe*X{v,,v*l<_

R/efe*X{v,,v‡YsY*r*Q

,{ÆN* R

ÿsQŽN 0^md-[‡YsY N Rb_ _gk*%olQ*~

0 Tag>k,,v*˘*˘

,{1 ag (*˘*˘š[IN)

,{2 ag (*~*V,,vIN*R)

,{3 ag (*NCgŒT*W,g* 1u)

,{4 ag (*y g*c*e)

,{5 ag (>y OŒT‡e S!j __,v9e*S)

,{6 ag (*S N Rb_ _*[‡YsY,,v) VS)

,{7 ag (?e*lŒTlQqQu;m-N,,vs^I{)

,{8 ag (*S R?eœ^ŒT*VE-*~*~)

,{9 ag (*VM|)

,{1 0 ag (Ye*€)

,{1 1 ag (*)\O:W@b 0u*€ŒT>y O*Oœ-)

,{1 2 ag (kSu*OeP)

,{1 3 ag (*~NmŒT>y Ou;m,,vvQ*N†~*W)

,{1 4 ag (œQQg0W:S,,v‡YsYs^I{)

,{1 5 ag (*l˘_b—MR,,vs^I{)

,{1 6 ag (^md-(WZZ*YŒT*[*^sQ*|-N*[‡YsY,,vgk*%o)

D-*N

0*[*l

0,{3 1 ag

^ Š

R/efe*X{vlQ*V?eœ^9hnc 0^md-[‡YsY N Rb_ _gk*%olQ*~
0,{1 8 ,{*c*N*~1u1 9 9 7 t^2 g1 8 *e?eœ^ O*◁8h*S,,v,g*bJT 0*bJT*N
~†N9hnclQ~*‘S,,v*l<_ 0L^?eŒTvQ*N*c*e 0* /f R/efe*X{v,,v,{ N*N*V*[*b
JT

ÿ*bJT,,vD ™e*b* 1 9 9 6 t^1 2 g3 1 *ebk 0

9hnc^md-[‡YsYgk*%*YXT Onxš[,v N,,*Q R

ÿ,{ N* R,i* †N R/efe*X{v,i*Q 0 R/efe*X{v*[*NCg,,v **N*Syr+R/f‡YsY
 ,,v*r*Q 0,{ÆN* R} gsQŽNlQ*~ Tag>k,,vD ™e 0

, { N* R

ÿ

N. R/efe*X{v((*V*[ÆT*N*S

1 . R/efe*X{vlQ*V(W0W t N YŽN^t*XÆTeY0W)RKN*•

ÿb—

*y1 6 0 s^*elQ*‘ 0 R/efe*X{v R:N1 1 *N ^G• 0 R/efe*X{v,,v g*š*p(
G r a u s p i t z e) :Nwm*b2 , 5 9 9 s|

ÿ gNO*p(R u g g e l l e r

R i e t) :Nwm*b4 3 0 s| 0*V RKN N,,v*VWMOŽN*f5f*17E

ÿ*S Y*V RKN N Y(W*f5f*17Œ,,vœeaW NŒT?–
 \QS*eq\ :S 0 R/efe*X{v,,v–™* /f*t\gyQ 0

†S*S,i*

2 . €*Sf[,v*S*s*ç

f

ÿ,Y*N,,v R/efe*X{vIQ*V,,v†~W* *NlQCQMR*V N*~*Neg1*]g*N •-
gE\OO 0(W* ›N €*S*S*s-N

ÿ*S*Nyr+R*c*SG u t e n b e r g „v—[Ye **P 0

3 . lQCQMR1 5 t^

ÿ*-,,šN b:N*SW lš ^*V,,v N*N w 0(W*SW lš*~*l*eg

ÿ*-,,šN‡e S^*WcwYeÆT)Y;NYe

$T \subseteq \mathcal{O}(W, \{5\}) \quad N^* \sim$

$$\ddot{y}^? - *R*f<\backslash *NeQ*O\dagger N)]f_{n,,v}W \quad l\check{s} \quad \wedge *V_v\wedge$$

NS_0W,,v*N*S*mE\ (W Nw 0

4 . ðe S,,v*e3€*f S N*v c*~0R,{1 2 N*~ 0(W*g t*fðv ^*~*l
N

ÿ1uŽN ^*VCgᵝR,,v*--N

ÿ*NMR,,v*-,,šN w*S b†N N*N* 0

5 . 1uŽN*~ bsQ*|

ÿ1 3 4 2 t^b_ b†N*t\gyQ* 01 3 9 6 t^

ÿ*t\gyQ,,vW e r d e n b e r g - S a r g a n s /O5r b:N±v*[* *N

$$\ddot{y}^*N$$

€:N N*v*O c* *N,,v T;N*~*lCg`Yš[†N*W@x 0 –

T,,v*~*l €v o n

B r a n d i s 7u5r*~ b†N,Y*N R/efe*X{v,,v S* ((*e&O!X†~0W

$$\ddot{y}^*N$$

€nxš[†N*s*NlQ*V,,v* Lu 01 5 1 0 t^

ÿ g

T,,vB r a n d i s 7u5r *t\gyQÆT*e&O!XVS*~†NS u l z /O5r 0(W* *
k*eg

ÿ* \$NWW^\0W(W*S*‘†~;NSO6R

N bŸR0Wnx*z†NvQCg)R 0(W—[Ye9ei—*eg

ÿ* **O c:N)Y;NYe*V*[01 6 1 3 t^

ÿ-

:P/}/},,vS u l z *[*e*^* *t\gyQÆT*e&O!XVS*~H o h e n e m s /
O5r 0 –

T _*Y†N...Q b

No`,,v N*~

ÿvQ h*_f3 0 t^ b%oNÇET*[L^*] €,,v*[\$R 0

6 . 1 6 9 9 t^

ÿ R/efe*X{v,,vIl*e* šNS_lQ5rpN

N†N*e&O!X†~0W

$$\ddot{y}_1 = 7 - 1 - 2 t^2$$

ÿpN

N†N*t\gyQ* 01 7 1 9 t^

ÿ*g tmQ N‡v ^ \NWW†~0W TĈEN:N N

ÿv^GS<h:N R/efe*X{v'YlQ*V 0

7 . (Wÿb4x&O b%oN*eg

ÿ R/efe*X{vŽN1 7 9 9 t^_N*S b†N N*N b:W 01 8 0 6 t^

ÿÿb4x&O^mmp†NhQ*_ a*_ ^*V

ÿ b*z†N*f5fT€*v

ÿ R/efe*X{v b†NvQ-N,,v N*N;NCg*V*[01 8 0 8 t^

ÿ^md-†N†~;NSO6R,,v g

TW * 01 8 1 4 / 1 5 t^

$$\ddot{y}^*_{\sim} N^*_{\sim} \quad O^*_{\langle KN}$$

$$\ddot{y} = R/efe^*X\{v \operatorname{Re}Q^\dagger N^*e - b^*z_{,,v}^* - a^*_T\epsilon^*v = 0$$

$$8 \quad . \quad \quad g \quad R$$

ÿ*N*N*[N6R?eSO,,v*S—

b* R_ŽN1Y% 0*v0R1 8 6 2 t^Mb * *~* ŒN NlQ5r*[^,,v 0*[*1

0*^*z†N N*N T;N*z*[6R*V*[

$$\ddot{y}^*O\alpha-lQ \ l^* \ 1u$$

ÿv^*~^N*⋄ O*S R*z*IETyb*Q,,~—{,,vCg)R 0

9 . * *k*eg_N/f R/efe*X{v*] N S*

z,,v _*Y

$$\ddot{y} = 1 - 8 - 5 - 2 = -14$$

NeY S ^*V* b,,v 0wmsQag*~

0_N*c*R†N* N*

z 0*V*[,,v*W@x*ç*e—_0R†N9e,,U

$$\ddot{y} = N^* \sim KN^*N, v^*e \quad P$$

ÿ*e8n N _*Y*SU\ 0FO/f

$\ddot{y}^*V^*[*N6q^*_wz$

ÿ*˂ Y*N*y l*Q*V b0R*V Y*[~b*]\O 0

1 0 . ,{ N!k NLu'Y b b*~Nm*SU\%N*‘ ek 0(W* N*€of
N

ÿ1 9 1 8 t^™!k b*z†N\$N*N?eZQ 01 9 2 1 t^

$\ddot{y} = N\tilde{y}^*e_{,v} = 0$

$0 = \text{YuHe}$

ÿ * ž[L^*v*c l;N6RI{'Y'Y*O* †N*[lQ lCg)R 0 g

$$\ddot{y}^1 \quad 9 \quad 2 \quad 3 \quad t^\wedge$$

ÿ

N^t*X *~†N Ny~ 0wmsQag*~

0 0

1 1 . ,g NLu2 0 t^*NÆT3 0 t^*N*V...Q?e*!qS:g*N6q*c*

N*e 0FO/f* 4 0 t^*N*Neg

ÿ4O -@w R/efe*X{v(W*f—_ *~NmA~cf*SU\,,v

T*e

ÿ>y OËT‡e S:g,,g_N

N*e9e* 0

1 2 . * *QAS^teg

ÿ R/efe*X{v(W Y*N?eV{†~*W_N*S%c†N*f R*‘ %o,,v\O(u

ÿv^*] b:N N>N*‘ %*VE-~*~„v bXT 0

*N*S

1 3 . 1 9 9 5 t^•^

ÿ R/efe*X{v,,v*N*S:N3 0 , 9 2 3 *N 0vQ-N

ÿ3 9 . 1 % /f Y*V*N 0

„gÿ[]T

1 4 . * *S3 0 t^eg

ÿs^GW,,~gÿ[]T

N*e*c*š 01 9 9 0 t^

ÿsYP[,~gÿ[]T:N7 4 \

ÿ7uP[:N6 9 \ 0

tZ?Q{k*N‡s

1 5 . tZ?Q{k*N‡s(*Q-

u Nt^...Q{k*N €) (W R/efe*X{v* 5 0 t^*N*Neg
N*e

NM- 01 9 9 0 - 1 9 9 4 t^

$$\ddot{y}_s^{\text{GW:N1}} \sim 2 \cdot N$$

ÿsSCS RKN N 0

$u^*\in R$

1 6 . 1 9 9 0 - 1 9 9 4 t^

$$\ddot{y}s^{\wedge}GW^{*}kt^{\wedge}*Qu3\ 8\ 8$$

$$T?Q*z\ 0$$

$$t^{\wedge},,\ddot{Y}^{*}\sim,,g$$

$$1\ 7\ .\qquad\qquad 1\ 9\ 9\ 5\ t^{\wedge}\bullet^{\wedge}$$

ÿ1 9 . 0 % „v*N*S(W1 5 *N
N

ÿ1 0 . 3 % „v*N*S(W6 5 *N N(sYP[`S1 2 . 2 %

ÿ7uP[`S8 . 3 %) 0

—[Ye

1 8 . 1 9 9 5 t^•^

ÿ R/efe*X{v*VM|9 6 . 4 % „v*N*S:NW lš)Y;NYe’_ 0(W Y*VE\ l-N

ÿW lš)Y;NYe'_`S5 4 . 5 %

ÿ*eYe'_`S1 5 . 8 %

ÿ1 4 . 2 % ^\ŽNvQ*N*O*N(1 5 . 5 % D ™e
 N*ς) 0

Ye*€
 1 9 . *N7 \0R1 6 \ž[L^]Nt^IN*R6RYe*€ 0vQ-
 N S*b5 t^ \f[ÆT4 t^~Nf[(*š*~~Nf[* *š-N((8 t^) 0
 g ^*l,,v T*yL€ N*m
 Ye*€:g O(^ f 0L€ Nf[!h 0 Y!h) 0 R/efe*X{v*l
 g* *],,v'Yf[0FO/f

ÿ * ag*~*S*Oæ-0R* *V'Yf[1\ƒ[,v:g O 0ck*e*v*f R*‘*%o
N*e,,vL€ N* *OÆT*N*N* *O

$$\ddot{y}^*Vdk$$

ÿ(WFU N 0€b/gŒET*N*N*SU\†~*W

$$\ddot{y} = g \wedge^{*l,v} T^*y^* \ast O:g \text{ } O \text{ } 0$$

œN

$$\ddot{y}^*\sim Nm$$

$$^*\sim Nm^*\sim_{,,g}$$

$$2\ 0\ .\qquad R/efe^*X\{v/f\ N^*NwQ\ \ g\ ^*l\ NLuT\epsilon^*|_{,,v^*s^*N^*}\ N\mathfrak{C}T$$

$$g^*R\ N^*V^*[\$$

ÿvQ* *QAS^teg*~Nm bŸR,,v*W@x/f*[~g,,v*~Nm*z*lĈET*[8^{šlQ*S,,v

z6e O*`

$$\begin{aligned} &\epsilon \; R_{\; ,v}g)R_{,v};`SO^*sfX \; 0yr+R/f^*V:N\check{z}[L^{\wedge}\dagger N \; N^*y \; \; gHe_{,v}{}^{\epsilon} \; \ddagger \\ &g^*RSO^*| \; 0 \end{aligned}$$

$$1\backslash \; N^*\sim_{,g}$$

$$2 \; 1 \; . \; \; \; R/efe^*X\{v^*V^*[\; \backslash$$

ÿ*~NmnfM HT NGS< *R

ÿ*Vdkb_ b'Y**R*R>R* * *VLueg€_ N*s,,v@\b— 01 9 9 5 t^•^

ÿ R/efe*X{v g1 5 , 4 3 1

TE\ l*N<N*~Nm;m*R 0vQ-N

ÿ1 4 , 4 0 6 *N(W R/efe*X{v1\ N

$\ddot{y}_1$, 0 2 5 *N(W*V Y1\ N 0d-1 4 , 4 0 6 *N(W R/efe*X{v1\ N Y

ÿ*k)Y* g7 , 7 8 1 *N*N* *Vegdk*]\O 0

2 2 . æQ N(W*V l*~Nm-N*]

N Q`S;N*[0WMO 0FO*[ŽNqS:g*e,,v*|*~* *~* *

ÿ* 6qET‡e Sof*%,v*~*b*Nw @w*‘ %L€*€ 01 9 9 5 t^•^

ÿ*N

g1 . 6 % „v*R*R>R(W,{ N*N N* *•1\ N 0aÆvQ*N*V*[„v*~Nm N7

h

$\ddot{y} \quad R/efe^*X\{v,,v$

$g^*RL^{\wedge} \quad Nck(W$

$N^*eib'Y \quad 01 \quad 9 \quad 9 \quad 5 \quad t^{\wedge}$

ÿ5 1 . 6 % „vck _L€*](W,{ N*N N1\ N 01 9 9 5 t^•^

ÿ,{ÆN*N N* *(*] N 0Kb*] N 0*^Q{) „v1\L€*Npe`S4 6 . 8 % 0
2 3 . ,Yæg*NŠbE\ l(
N S*b*k)Y*N*V Y0Rdk*]\O,,v*NXT) \O:N*←{*W@x

ÿ R**Qeu g

N

$$T=0(W^*N\langle N^*\sim Nm;m^*R,,vE\backslash\ l-N$$

ÿ2 . 1 % 1\ NŽNœQ NŒT—g N

ÿ3 9 . 8 % 1\ NŽN*] N 0Kb*] NĈET*^Q{ N

ÿ5 8 . 1 % 1\ NŽN

g*RL^ N 0

2 4 . 1 9 9 5 t^•^

ÿ*N<N*~Nm;m*R,,v,g*V*N*S*k<O`S4 9 . 8 % 0

1Y N

2 5 . *N*VE- Neg

w

ÿ1Y N‡s^_NO 0^_ \ g... * 2 % „v*e P

ÿ1 9 9 6 t^•^:N1 . 4 % 0

*V...Qu*N;`<P

2 6 . R/efe*X{v,,v*V...Qu*N;`<P*S*S'Y* 0O—{ 09hnc N!k,,v*◊0O

ÿ1 9 8 8 t^*V...Qu*N;`<P:N1 7 *N^t*X*l*

ÿ*NGW*N<P*~:N5 6 , 0 0 0 ^t*X*I* 0FO/f

$\ddot{y}^* \quad *NpeW[v^\wedge$

$N^*_{\lhd}$

$\hat{f}_{Y^* \bullet \sim}$

ÿ*V:N(O,Y1 9 8 8 t^

$$\ddot{y}_3=0\quad \% \quad *N=N_{,,v}*R*R\triangleright Rv^{\wedge\wedge}\text{---}R/efe*X\{vE\setminus 1=0$$

N

ÿ*[*lĈET?eœ^

?eœ^,,vb_ _

2 7 .

R/efe*X{vlQ*V/f N*N*N l;NĈET*ĸ O:N*W@x,,v N*^6R T;N*z*[6R*V
[0*V*[,vCg>R(WŹNlQ5rĈET*N 1 0

*[*l

2 8 . *vMRž[L^,,v*[*l*S* *n0R1 9 2 1 t^

ÿ/f,{ N!k NLu'Y b

T

$N^*e^{\sim*}\wedge^*O^*_{\zeta},v^{\sim*}\alpha g \quad 0$

N*NMR1 8 6 2 t^,,v*[*l*v*k

ÿ*N l*v*[ŽNlQ5r,,vCg)R'YE^*^ib'Y 0FO/f* ›Nt^eg

ÿ*[ŽN*[*l,,vwQSOag>k*%*‘

f>fX[(W@w

N

$T^*\%_0^*p$

$$\ddot{y}^*Vdk \setminus \text{---} \%o^{*[*[*]^*}L^{\wedge}O^{*}\lhd 0$$

$$^*W,gCg)R\mathfrak{E}T^*1u$$

$$2\ 9\ .\qquad\qquad 0\ R/efe^*X\{\imath Q^*V^{*[*1}$$

$$0^*O\mathfrak{a}\text{--}N^*|\ R^*W,gCg)R\ 0wQSOeg^*\lhd$$

ÿ* >NCg)R S*b*l<_b—
 MRs^I{ 0E\OOÆT*~ b,,v* 1uCg)R 0*N*N* 1u 0*[*^Cg Z 0*[*<ÆTfNb
 — *<*O*[* 0luck _*N}T,,v*l~[* L^ck _*[* t,,vCg)R 0*y g" *N
 N*S*O*r 0L^ N* 1u 0*O*N* 1u 0* 1u Š*<,,vCg)RÆT*e*•* 1u 0* 1u*~>
 yÆT*– O,,vCg)R 03u*<,,vCg)RÆT N*<,,vCg)R 0

Cg)RL€*€,,v RM‘
 3 0 . (W R/efe*X{vlQ*V,,v*S*‘gb?e6R*^~N

ÿ*V*[CgᵝR(WŽNlQ5rĈET*N l 0CgᵝR,,v R R*S0R* Nek,,v*O*ᵝ

ÿ*V:NL^?e:gsQ(?eœ^) 0*z*l:gsQ(*˂ O) ÆT*S*l:gsQ(*lb-|*~) T* *b
g* *],,vCg)R 0FO/f*V:N?eœ^/f1ulQ5r9hnc*˂ O,,v*^*˂*N}T,,v

ÿ@b*N*¸ O-N,,v YpeZQ_N/f?eœ^~N,,v YpeZQ 0

lQ5r

3 1 .

lQ5r(*vMR/f R/efe*X{vIl*e* šNS_ŒN NlQ5r) (W R/efe*X{v,,v*V*[*
~,,g-N`S*‘ %o0WMO 0lQ5r/f*V*[CQ–™

ÿ*[Y*Nh^*V*[0lQ5r9hnc*ç O,,v*^*ç*N}T?eœ^ bXT

$$\ddot{y}^* = g \left(l \langle N^* l^* \rangle^{\mathbb{E}T} - R \langle N^* l^* \rangle^{\wedge, v^* l^*} \right)$$

$\ddot{y}^*N^*SL^?e^*lb-b-$ •

ÿFO*!^j-[*VÆT R<N*lb-,v bXTd- Y 0lQ5r gCg*S ^f MQ*NÆTÿ^d-
R<N*^*^

z ^ 0 b*b'}`Cg>RÆT9hnc

gHe t1u*%oce*^ O,,vCg)R* Nek R:_†NlQ5r,,v0WMO 0*S Y

$$\ddot{y}^*k_{y^*}l_{\kappa}^* \quad \text{---} \quad \%_{\circ}^* \sim^* \quad lQ5ryb^*QMb^*\epsilon uHe \quad 0$$

N^*

ÿlQ5r(WL^ OvQCg)R*e_N*S0R*[*l*%š[,,v*~_g 0

*_ O

3 2 . R/efe*X{v,,v*_ O*k4 t^ >N N!k 0*_ O1u2 5

T*_XT*~ b

ÿvQ-N1 5

Teg* *š0W :S

ÿ1 0

Teg* NO0W :S

ÿ c*k<O*Nh^6R * nfM „v 0*v*cÆT*y*[„v•bhys^I{ >N*Nu 0*S
 g(WhQ*V*f—_8 % *N N
 hy„v?eZQMb*€* eQ*< O 0*<XT(W _U\vQL€ N;m*RKN Ye\L^vQL€#
 0*< O g*‘ %o„v*N*R/f*S R*z*l 0*c*S*V*[ag*~ 0yb*Q*V*[„~—{

$$\ddot{y}^*[\text{?e}\alpha^{\wedge}\mathbb{E}T\quad T^*l^{\sim}[,v^*N\}T^*c^*Q^{\wedge*}\text{,}$$

ÿ*N*S*{ t*V*[L^?e* *• 0*◁ O\O*Q*Qš[,,v*łš[*Npe/f* * *◁XT;`pe

N RKNÆN 0

3 3 . (W,gJ*◁ O(1 9 9 3 - 1 9 9 7 t^) -N

ÿqQ g N*N?eZQ 0Vy*V

$$T^*v_{g1} = 3^{-\wedge}$$

ÿ`S\*~\*[ Ype ÿ R/efe\*X{v\*o\* lQ lZQ`S1 1 -^

ÿ* 1u

TUS`S1 -^ 0

?eœ^

3 4 . ?eœ^1u5

T bXT,,g b ÿ?eœ^_TM*v 0?eœ^oR-TM*vÆT*S Y3

T bXT 0?eœ^ bXT1ulQ5r9hnc*< O,,v*cPf*N}T 0?eœ^_TM*v

gCg O~{lQ5r ~*S,,v@b g*l*NÆT}T*N

$\ddot{y}^*N^*S^*\sim 1ulQ5ryb^*Q,v^*z^*l\ 0?e\alpha^{\wedge}-$

$^{TM}*v^*[\ Y^*Nh^?e\alpha^{\wedge}\ 0^*\ 1\ 9\ 2\ 1\ t^{\wedge}*Neg(\ d-1\ 9\ 2\ 8\ -\ 1\ 9\ 3\ 2\ t^{\wedge})$

ÿ\$N`Y?eZQ N*vT€ T*S R?eœ^

ÿ(W*ç O-N`S Ype,,v?eZQ(W?eœ^ bXT-N\_N`S Ype

ÿv^ N*b*N?eœ^™*v,,vL€MO 0?eœ^/f g*šL^?eS_@\\

ÿ^\

N

g3 0 *N*ŒT N>N{Œ Y O†~†™ŒTžR<N Y 0?eœ^,,v*]\O1u'Y*~5 0 *
N*YXT OŒT~*•*YXT O R*N... *R 0

3 5 . ?eœ^ gCg*S ^}T*N

$$\ddot{y}^*Vdk_{N/f} \quad N^*N^*z^*l:g,,g \quad 0FO/f$$

ÿ}T*N*S*S*N(W*I<_ÆT*V*[ag*~,v*W@x N ~ ^ 0
 3 6 . ?eœ^ # *vcwlQqQ*I<_
 N,,v4 *N*W*‘ O(*V*[*VfN†™ 0*V*[ZSir†™ 0*—
 PNf[!hÆT*V*[Ž /g6e*...†™) ÆTlQqQ*I<_
 N,,v3 *N:g,,g(€t^ÆTW ^*Oi- *W**~*~ 0 R/efe*X{v*R>RÆTgq

flQ*S*N*S R/efe*X{vdq l>O”^lQ*S) 0

3 7 . (Wyr+R*`*Q

N

ÿ?eœ^_NL^ O N*{— Cge^Qe 0*[ŽNL^?eS_@\\ b>y:S,,v*Qš[

ÿ*S T?eœ^*c*Q N*◁ 0

*S*l*{−
3 8 . *S*l*{− R:NlQqQ*l◁(yr+R) *{− ÆTnf *{− 0
3 9 . lQqQ*l_ *{− Cg1uL^?e N*◁*YXT OÆT*V*[*lb−
L^ O 0L^?e N*◁*YXT O;N-
^*SvQ*Nh^1ulQ5r9hnc*◁ O,,v*cPf*N}T 0 N*◁*l~[1u*◁ O*N}T 04 t^*Ng

NS_J* O

T*e*_~_g 0L^?e N*^*YXT O*[t*[?eœ^ b*Nh^*YXT O,,v*Qš[ÆT}T*N

€*c*Q,,v N*◁ 0*[ŽNL^?e N*◁*YXT O,,v*Qš[

$$\ddot{y} = O(gq^*l_{\leftarrow})$$

$$N_{\text{---}}^*c^*Q^* = N_{\text{ek},,v} N^*_{\leftarrow} 0$$

$$4 \ 0 \ . \qquad *V^*[*lb_{\text{---},,v} \ bXT1u^*_{\leftarrow} \ O \ >N$$

ÿ*Ng”Nt^ 0*N*Nd–*[HhKN Y

ÿ* *N(NvQ*N;m*R 0b- •EToRb- • — %o*~lQ5rnX*ç 0*V*[*lb-
„vL€*€ S*b*S0R*[*l*Oæ-„vET(W 0'k2m*NCglQ*~
0-Nnx*z„v Ty~Cg)R

$\ddot{y}^*[*]b-$

NL^?eS_@\KN*•L€Cg*Q z\O*Q*^*Q

ÿ*N*S\O:N?eœ^ bXT,,v N*N*~<_h*g*l*^

ÿ8h*g*l<_/f&T&{ T*[*lŒT?eœ^ag*N/f&T T*l 0

4 1 . ck8^,,v*S*I*{–

Cg S*b*[lNŒT R<NHh*N,,v*S*I*{ t 0 (u,,vŸS R S*b*S4Y*[*g 0*N*
N*Q*^ŒT* 1u*c*Q*<nc

$$\ddot{y}^*[\check{Z}N \quad R\langle NHh^*N$$

ÿ* S*b R<Nw *<ŸS R 0 N*[*lb-/f*<(W*t\gyQ,,v T;N*V*[*lb- 0*[*S-
u%oN*,<,v l<N*,<*<

ÿ(W T*V*[*lb-*c*Q*^*^KNMR

ÿ*_ {~HQ(W*^JT@b(W0Wž[L^ ĄE*%o

z ^ 0*S g(W ĄE*%o1Y%

ÿMb*€ T\O:N N*[*lb-,v*V*[*lb-*c*Q3u*ˆ 0€N*[*lb-/f T;N*šI{*lb-

ÿ N*[*lb-/f T;N g*š*lb- 0* \$N*N*lb-* /fT€ T*[Hh*lb- 0

*V

ÿ Y t*O*r*NCgHh*N,,v*ł_

z ^

*S*ł

4 2 . *NUO*N*S %*%—_* *],v*W,gCg)RÆT* 1u*S0R*O*r

ÿ* gCg*c*^*lb-[*g b* L^w *^ 0*ł[Cg)R S*bÿ^d-L^?e b?eœ^*Qš[

ÿ/e*N_c*[T P b*[ir(b^—ir(_c*[,,ve^ P 0*V*[*lb-
 ,,v*N*R* S*b8h*g*sL^*l<_/f&T&{ T*[*l

ÿv^(W*_ %*e*[^*g>N*!*% bvQ-N N* R*eHe 0(Wyr+R*`*Q

N

ÿ* *S T*(W*eyr*b*e!X,,v'k2m*NCg*lb-*c*Q N* 0

v[XT

4 3 .

v[XTL€MO/f1 9 7 6 t^(W R/efe*X{v* z,,v 0*v*[XT1u?eœ^*N}T

ÿvQL€*€/f*[

$N^*V^*[L^?e^*\{ \quad t \quad gsQ,,v\lhd Ny^{\sim}*c^*Q^*N^*N \quad a^*\%_o$

ÿv^,T*S*[S_@\\L^*R,,v•b*⌢ET*^*⌢ 0

*VE- *S*|B|*R

4 4 . * 1 9 8 2 t^9 g8 *e*Neg

ÿ R/efe*X{v*] b:N1 9 5 0 t^1 1 g4 *e,,v 0'k2m*O*b*NCgÆT*W,g* 1u
lQ*~

0,,v N*N *~*V 0*V*[*lb—*[0'k2m*NCglQ*~

0*%š[(W R/efe*X{v,,vgbL^*`*Q* L^*vcw 0lQ l,Yæg*%—

—* *],,vCg)R*S0R*O*r

ÿ*S-™HQ T'k2m*NCg*YXT O*c*Q3u*ç

ÿ6q

T T'k2m*NCg*lb-*c*Q3u* 0* 7hZP,,v N*NHQ*Qag*N/f R/efe*X{v*V*[*lb-
,,v*[Hh*]*~*_g 0

”N

$$\ddot{y}^*VE-^*NCglQ^*\sim\mathbb{E}T \quad R/efe^*X\{v,,v^*l\lrcorner$$

$$R/efe^*X\{v \operatorname{Re}Q^*VE-^*NCglQ^*\sim,,v^*`^*Q$$

$$4 \ 5 \ . \qquad R/efe^*X\{v^*]yb^*Q\dagger N \ N^*| \ R$$

N*O*b*NCg gsQ,,vT€ T*VlQ*~ÆT'k2m t∠N OlQ*~ ÿ

ÿ 1 9 4 5 t^6 g2 6 *e,,v 0T€ T*V*[*z
0 ÿ

ÿ 1 9 4 9 t^5 g5 *e,,v 0'k2m t∠N O*z
z
0 ÿ

ÿ 1 9 5 0 t^1 1 g4 *e,,v 0'k2m*O*b*NCgÆT*W,g* 1ulQ*~
0

ÿ S*b Ty~*š[fN ÿ

ÿ 1 9 7 9 t^1 2 g1 8 *e,,v 0^md-*[‡YsY N Rb_ _gk*%lQ*~
0 ÿ

ÿ 1 9 8 7 t^1 1 g2 6 *e,,v 0'k2m2-bkw‘ RÆT
N*NS b g* *N<h..._G b YZ lQ*~
0 ÿ

ÿ 1 9 8 9 t^1 1 g2 0 *e,,v 0?Q*zCg)RlQ*~
0 ÿ

ÿ 1 9 9 2 t^5 g2 *e,,v 0'k2m*~Nm:SOSš[
0

ÿ*S TD- *NÆT*ς[fN 0

NCglQ~,vgbL^*`*Q

4 6 . R/efe*X{vj`^[,vŸS R/f*S *~*€-

Yu ^[,vag*~IN*R 09hncnfM ŸS R

ÿ*VE-ag*~* \wQ g*l<_0WMO 0

*[*NCglQ*~,,v*[O

4 7 . (W*VE-*NCg‡efN—_0R*< Oyb*QÆTuHe*e*N*Sdk

$T(W^*_\infty)$

ÿ?eœ^*O T R/efe*X{vlQ O *b gsQ*`*Q 0FO/f

ÿt'ŽN(W*S4Y*S ŠŒTfNb— a*‰-N*~8^*c0R 0'k2m*NCglQ*~

0

ÿ@b*N*S*N*c*◁

$$\ddot{y}^*[*\quad N\ddot{\neq}efN,,v\upharpoonright N^*\%_o$$

$$z^{*^f}\quad *{\check s}\quad 0$$

€sQŽNvQ*N*VE–OSš[

$$\ddot{y} = R^* * Q^* S^* \epsilon_v \wedge \text{---} \mathbb{E}[h_Q, Y] dk = 0$$

4 8 . — %o c*Q,,v*W,g*•~/f

ÿ@bg,,v*1<_E Tag<O

$\ddot{y}^* \quad g^* \vee E - OS\check{s}[$

$$\ddot{y}^* \quad \text{---} \quad \%_0^* \sim^* \quad {}^* \lhd \quad O_{,,v^* \lhd^* \lhd} \mathbb{E} T l Q \quad \wedge$$

ÿ*VdklQ O*S*N*e*O0W*f—_* { |D TMe 0*I*%oÆTOSš[,,vuHe(W~[*elQ*b-
 NlQ ^ 0OSš[,,vHh‡e*S T?eœ^[r "}*S 0

mQ

ÿ R/efe*X{v,,v‡YsY*r*Q

*[Š

4 9 . *S*N*◁:N

ÿ1 9 9 2 t^6 g1 6 *e,,v 0*[*l

0*[ŽN(W R/efe*X{vž[*s7usYs^I{w 0R†N*c*R\O(u 0*[*l

fnx*%š[†N7usY*l<_s^I{ 01 9 9 2 t^6 g,,v*< O*R*< %Bl?eœ^(W1 9 9
6 t^KNMR^md-*l<_Hh‡e-N*N6q*S*%o,,vgk*%o*`*Q 0*s(W* N*
z*S*ç:N*]*~*~_g 0
5 0 . }†6q*]*~ g†N7usYs^I{,,v*l<_ N,,vHQ*Qag*N

ÿFO* v^

N asT@w<Nž[N,,vs^I{*]*~ž[*s b \ O* *R*Q*s 0*N

T \ — %**S*c*e

ÿ/e cÆT R <Nž[N7usYs^I{„v*
 z 0

Ye*€ÆT* *O
 5 1 . S_1 8 0 6 t^ž[L^IN*R6RYe*€*e

ÿv^

N %BlsYi[P[^——_ Nf[

N*S 0*v0R1 8 6 5 t^Mb*[sYi[P[ž[L^†NIN*R6RYe*€ 0(W* Nek*m *eb—

ÿ_N/f OHQ €Q†7ui[0*Vdk

ÿ R/efe*X{v,,v,{ N@b-Nf[/f N@b *V*[7uP[f[!h

ÿ b*zŽN1 8 5 8 t^ 0*v0R1 8 7 0 t^Mb _*Y*b6esYu 01 9 3 7 t^

ÿ R/efe*X{v _žR†N,{ N@b*š*~-NI{f[!h(*š*~-Nf[] 0 •-
g*Neg(*v* 1 9 6 8 t^)

ÿ* _N/f N@b7uuf[!h 0*vMR,,vYe*€*l*]*l g*[7usYu:S+R*[..._,v*NUOag‡e 0
N* ž[E– N

ÿ7usY,,vYe*€S * *N6qX[(W@w*‘‘Y*]+R 0

5 2 . 2 0 t^MR

ÿ

N7uu*v*k

ÿsYu(Wnf -Nf[-N,,v*k<O*N`S*~'Y Ype

ÿ

€(W*š*~-Nf[-N,,v*k<O R`S \pe 0* * *e*Neg

ÿ7usYu,,vs^I{:g O—_0R†N9e,,U 0

h^1 T*~Ye*€-N,,vsYu*k<O
t^*N \f[L€ N-Nf[nf -Nf[*š*~
Nf[1 9 7 5 5 0 % 4 6 % 5 8 % 3 3 %
1 9 8 5 5 0 % 4 4 % 5 7 % 4 2 % 1 9 9 5
5 0 % 4 1 % 5 4 % 4 7 % eg n ÿ*~Nm*

ÿ 01 9 9 5 t^*~*t^t'

0 0

5 3 . * 1 9 6 8 t^*N

ÿ R/efe*X{v,,v*š*~-Nf[Mb _*Y*b6esYu 0(W1 9 6 8 t^KNMR

ÿ*` N*š*~-Nf[,vsYu — %o0R* *V,,vf[!h*S

ÿ b0R*[*[!h 0* *N*š*~-Nf[_*Y*b6esYu*Neg

ŷsYu,,v*k<O

N*ežX R 01 9 9 5 t^

$$\ddot{y}(W \quad R/efe*X\{v,,v*\check{s}^{*}\sim-Nf[-N$$

ÿsYu * `S NJS(4 7 %) 0

h^2 R/efe*X{v*š*~-Nf[-N,,vsYu*k<O

t^*N qQ*< sYu % sY-

u 1 9 6 0 2 0 4 0 0 % 1 9 7 0 3 3 6
4 3 1 3 % 1 9 8 0 3 7 1 1 4 9 4 0 %
1 9 9 0 4 8 7 2 2 0 4 5 % 1 9 9 5 5 6
7 2 6 5 4 7 % eg n ÿ*~Nm*

ÿ 01 9 9 5 t^*~*«t^t’

0 0

5 4 . (W T{|f[!h-N

ÿsYu*c*S,,v*W@xYe*€

N7uuž[E– N/f N7h,,v 0FO(WyY*N

Teg* Nek*m „vS * N

ÿ R*Q*s†N*‘Y:S+R 0(Wf[_*]-N

ÿsYu*N`S*~ N RKN N

ÿ

€7uu R`S N RKNÇEN 0*v0R,g N*~7 0 t^*N

ÿ* *y*k<O1Ya^,,v*`*Q*N6q^—8^ z*Q 0

N*

$$\ddot{y}^*_{\{\sim c^*Q}$$

ÿ* N*k<O* 8 0 t^*N*Neg*O c

N*S,,v*`*Q — %o R*N ~ck 0

h^3 f['_*]-N,,vsYu*k<O

t^*N qQ*< sYu % sY-

u 1 9 7 0 4 5 9 6 8 1 4 . 8 % 1 9 8 0
7 9 4 2 8 0 3 5 . 3 % 1 9 8 7 9 5 8 3 7
3 3 8 . 9 % 1 9 9 4 8 4 5 3 0 1 3 5 . 6
% eg n ÿ*~Nm*

ÿ 01 9 9 5 t^*~*«t^t’

0 0

5 5 . }†6qsYu(WL€ NYe*€*eb—) \†N

N7uu,,v*]*

$\tilde{y}FO^*_{\sim} b^*_{\lessdot}$

ÿ(WL€ N *b*eb—

ÿyY*N*N@\P-ŽN N>NxQ<W,,v‡YsYL€ N

ÿ;N %o/f*c*SFU NYe*€ŒT*W*ˆ\O:NŽ *S ^ŒT •.U*NXT 07uu,,vL€ N
*b f*V*QNN/fsYu,,v2

P 0

5 6 . R/efe*X{v*l g* *],,v'Yf[0*Vdk'Y Ypef[-
u0R^t*X 0eY0W)R b*_V,,v'Yf[ŒTf[b-1*ˆ 0

N* ʏN*V*[*~ gOSš[%o['c

ÿnx*O R/efe*X{v7usYu

gf[`NMOñ 0}†6q* *Qt^ÆT* *QAS^teg(W R/efe*X{v,,v@b gf[u-N

ÿsYu,,v*k(O*)*~ NGS

ÿFO7uu*N`S;`pe,,v*~ N RKNÇEN 0* g*p*N*N T*`

$\ddot{y}^*V:N$

Ndk

T*e R/efe*X{v*š*~-Nf[-N,,vsYu*k(O*) NGS0R * 5 0 % 0>f6q

ÿŒ[b*š*~-Nf[f[N,,vsYu

NaŒ7uu* 7h'Y Ype *b* Nek N'Yf[f[`N 0

h^4 ^t*X 0eY0W)RŒT*_*V'Yf[-N R/efe*X{vf[u,,v7usY*k<O

t^*N qQ*< % 7uu % sY-

u 1 9 8 0 2 3 4 7 6 . 9 % 2 3 . 1 % 1 9
8 5 3 0 4 7 0 . 7 % 2 9 . 3 % 1 9 9 0 4
0 4 7 0 . 0 % 3 0 . 0 % 1 9 9 2 4 2 3 6
7 . 4 % 3 2 . 6 % eg n ÿ*~Nm*

ÿ 01 9 9 5 t^*~*†t^t’

0 0

5 7 . >f6q

ÿsYu>P TŽN *b‡e*y

ÿ

€7uu Rf >P TŽN *b*~Nm f[ŒT*]ĸ_*ĸ

z

$$\ddot{y}^* \rhd N^*y$$

$$z<O^*S^*c>O^*f\}Y,,vL\in N^*SU\backslash MRof\ 0(W^*]^*y-N$$

ÿ S*b(W*←{:g*yf[*eb—

ÿ_N/f7uuE\ Y 0

5 8 . R/efe*X{vg N@b N Nf[b-((R/efe*X{v:g*hf[b-
0*V:N* /f N@b€b/gf[b-

ÿ@b*N

N* :NGY

ÿf[u n Nr,*QNNhQ/f7uu 0(W4N* „v^t*X ^KQ*eG•„v€b/gf[b–
ŒTZi *S#W R*NG•„v*~NmŒT*{ tf[b–

$$\ddot{y}_N g\{|\langle O, v^* \rangle| Q \geq 0$$

$$5 \cdot 9 \cdot \dots > f$$

€ f*‰

ÿsYu^_*e*O\PbkYe*€* Bl 0 u* (WL€ N-Nf[bnf -Nf[*k N

ÿ*~**~*m „vsYu_N \ŹN7uu 0(W*š*~-Nf[*k N*e

ÿ

^ g*c*S'Yf[Ye*€,vsYu \ŽN7uu 0sS O* *QAS^{t^eg,v<} *R/f*]* (W
N*e) \

ÿFO(W g*š N*~,vYe*€*eb—

$$\ddot{y}^*v''^{\wedge,,v^*]}+R_{\text{NAS}} \quad R$$

$f > f_0$

$6 \cdot 0 \cdot 1 \sqrt{u}$

€ Š

$$\ddot{y}^2_2 \; 5 \; - \; 4 \; 4 \; \; \; \backslash t^{\wedge},,\ddot{Y}^{*}\sim$$

N4 5 - 6 4 \t^,,\ddot{Y}*\sim KN*\bullet,,vYe*\epsilon 4ls^*S g^_ \,,v*]+R 0FO1\#YsY

€ Š

ÿR—t^‡YsY,,vYe*€4ls^* * *šŽN €t^‡YsY 04 5 -

6 4 \t^,,Ÿ*~‡YsY5 9 . 2 % *N N* IN*R6R \f[

ÿ

€2 5 - 4 4 \t^,,ÿ*~‡YsY,,v*v”^peW[R*N*N/f3 7 . 8 % 0
N*

ÿ7uP[„v g*šYe*€4ls^* * *šŽN‡YsY* N*p_NAS R z*Q 0*S

g1 9 . 9 % „v7uP[*S*c*S0RIN*R6RYe*€

ÿ2 5 - 4 4 \t^,,ÿ*~7uP[2 6 . 5 % * Nek*m (*š*~-
 Nf[0*š*~L€ N*W*˂ 0*š*~ N N*W*˂ 0'Yf[])

ÿ

$$\epsilon^*v''^{\wedge t^{\wedge}},\ddot{Y}^*_{\sim},v\ddagger YsY^*k\lhd O \quad R/f1 \quad 2 \quad . \quad 7 \quad \% \quad 0(Wf \quad 'Yt^{\wedge},\ddot{Y}^*_{\sim}S_{-}N$$

ÿ* *y*`Šk*k<O*N6qAS R z*Q 0

h^5 4 5 - 6 4 \t^,,Ÿ*~7usY g*šYe*€4ls^(1 9 9 0 t^)

'`+R *NŒ[b

IN*R6RYe*€

L€ N*W*ˆ

šI{Ye€

vQ*N

qQ*ˆ sY 5 9 . 2 % 3 1 . 3 % 7 . 5 % 2 . 0
% 1 0 0 . 0 % 7u 2 2 . 0 % 5 1 . 0 % 2 6 .
0 % 1 . 0 % 1 0 0 . 0 % eg n Ÿ*~Nm*

ÿ 01 9 9 5 t^*~*⌵t^t’

0 0

h^6 2 5 - 4 4 \t^,,Ÿ*~7usY g*šYe*€4ls^(1 9 9 0 t^)

`+R *NŒ[b

IN*R6RYe*€

L€ N*W*⌵

šI{Ye€

vQ*N

qQ*⌵ sY 3 7 . 8 % 4 7 . 9 % 1 2 . 7 % 1 . 6
% 1 0 0 . 0 % 7u 1 9 . 9 % 5 2 . 5 % 2 6
. 5 % 1 . 0 % 1 0 0 . 0 % eg n Ÿ*~Nm*

ÿ 01 9 9 5 t^*~*«t^t’

0 0

‡YsY

$$N^*R \triangleright R \quad \wedge : W$$

6 1 . }†6q(W*]\Ot^,,ÿ,,v*N*SS_-N

$\ddot{y} \nmid YsY^* \quad * \quad \dots \quad * \quad JSpe$

ÿFOyY*N*N`S*N(N*~Nm;m*R*N*S,,v3 8 % (1 9 9 0 t^) 0*6q

ÿ* 1 9 7 0 t^*Neg* N*k<O g@bžX R 0FO

N7uP[*v*k

ÿ‡YsYFT(W*[-N,,v*Npe*f Y

$$\ddot{y}^* = N^*p^*N6qAS \quad R$$

f>f

ÿ7uP[(W*~Nm;m*R*N*S-N`S6 2 % 0

h^7	*]\Ot^,,ÿÆT*~Nm;m*R*N*S-N,,v‡YsY*k<O			
	1 9 7 0 t^	1 9 8 0 t^	1 9 9 0 t^	*]\Ot^,,ÿ;`*N*S-
N,,v‡YsY*k<O	3 4 %	3 6 %	3 8 %	*~Nm;m*R*N*S-
N,,v‡YsY*k<O	5 5 %	5 6 %	5 8 %	eg n ÿ*~Nm*

ÿ 01 9 9 5 t^*~*⌢t^t’

0 0

6 2 . *N⌢N*~Nm;m*R,,v‡YsY*k⌢O

ÿ*N* eQ*]\O ^:W,,vt^,,Ÿ _*Y*v0R Ot^,,Ÿ:Nbk
N*e *Q

ÿ

€7uP[,v*v''^*k<O R/fHQ NGS

ÿ6q

$$T^*O \rightarrow c(W^{\wedge 8^*}, v_4 l s^{\wedge} N$$

$$\ddot{y}^* \quad N^*p_N/f>f$$

$$\in f^{*0}_{\infty, V} \quad 0$$
$$h^8$$

ct^.,\ddot{Y} R R_{,v^*N\langle N^*\sim Nm;m^*R_{,v\ddagger YsY\mathbb{E}T7uP[*k\langle O(1 9 9 0 t^{\wedge})

t^,,ÿ ‡YsY 7uP[2 0 -

2 4 7 7 % 7 8 % 2 5 -

2 9 6 7 % 9 1 % 3 0 -

3 4 5 5 % 9 7 % 3 5 -

4 9 5 6 % 9 9 % 5 0 -

5 9 4 5 % 9 7 % 6 0 -

6 4 2 2 % 8 5 % eg n $\ddot{y}^* \sim Nm^*$

ÿ1 9 9 0 t^*N*Snf*g(4N*epeW[] 0

6 3 . (WL€ N*]\O-N

ÿ7uP[,vL€MO€_€_f *š 07usY,,v*k<O c* *• R R

N=*v

T 01 9 8 7 t^

$$\ddot{y}^*\sim Nm^*\quad *[(WL\epsilon\mp YsY,,vL\epsilon MO^*\quad L^{\wedge}\dagger N\quad Ny^{\sim}\quad \mathbb{E}^*g$$

ÿ—*Q†N

N RpeW[0*k*e‘u*•

ÿ*N)Y*S*N—_ *Q*v’N*[*k,,v*~œg 0

6 4 . ;`,veg

w

ÿ2 3 % „v7uP[(WL€ N NMOŽN*š*~L€MO

ÿ

€* *y*`\*Q,,v‡YsY\*N`S4 % 0(W€b/gL€MO-N

ÿ7uP[,v*kO(4 5 %)

N‡YsY,,v*k<O(4 1 %) 'Y* *vS_ 0*[*kKN

N

ÿJS€b/gÇT^—€b/gL€MO-

N,,v‡YsY*k<O(3 3 %) * * *š*Q7uP[,,v*v”^peW[((2 2 % 0

6 5 . *k*e‘u*•

$$\ddot{y}^*~^*y$$

$$Ns^{\wedge a^{\wedge},v^*`*Q/f} \qquad g \ N\mathbin{\mathbb{N}}\check{S}^*V,,v \ 0\text{--}^{\text{TM}}HQ$$

ÿ‡YsY

N* HN*‘*%oYe*€ 0vQ!k

ÿŠb*1 a>R>e(W*[*^ĈET*[-N*N*S8^8^

NKN*v4O -,v1\ N-N*e

ÿ;- x†N* 0R*f*š*~L€MO,,v:g O 0*S Y

ÿsS OYe*€4ls^

N7uP[*v

ÿ‡YsY* *S*€G 0R*V:NOP*%œTgk*%

€ b,,vq_*TL€ N*SU\,,v*f'Yœ- x 0\$\vQ/f

ÿ*˂ Y‡YsY* *S*€*V:NvQ>y Oag*NP–6R

€

N?a aZWš[0W* Bl* *Ž,,v*SU\ 0

h^9 TL^ N7usY*k<O
L^ N 7u(%) sY(%) *š*~L€MO ÿqQ*
ÿ 2 3 4 *l<_/ *OXb<N*R 4 0 5 *”L^ 2 7
2 :g*h/ *< Y 2 7 5 8 f 2 6 6 *e
†™ N 1 0 7 kSu 8 *epenc *Oi–
epenc 1 0 Ÿq~*] 4 5 4 1 kS-
u 5 6 5 0 *l<_/ *OXb<N*R 3 7 5 9 :g*h/ *
Y 4 5 3 3 *Oi–
4 4 4 3 *”L^ 4 8 4 5 JSŸq*~/
NŸq*~*] 2 2 3 3 *~*~ 7 1 8 8 n m/ |i
,*{ t 8 4 8 5 vQ*N
g*R 7 3 8 eg n ÿ*~Nm*

ÿ1 9 8 7 t^ Œ*g 0

6 6 . 1\7usY@b*N<N,,v*]\O

€ Š

ÿ*N*NKN*•X[(W@w

$$f>f_{v^*}] + R \rightarrow N, \neg eg$$

ÿ‡YsY Y*N<N

g*RL^ N*]\O

ÿ*] NÆTæQ N* *•‡YsY*Npe Rf \ 0*N<N8 fÆT*”L^ N,,v‡YsY*k<O*vS
_ *š ÿ R+R:N1 0 . 4 % ÆT1 0 . 5 % ÿ 0(W*O*€ÆTYe*€L^ N

ÿ‡YsY*k7uP[*f:N;m*
 0

h^1
 0
 xQ<W,,vsY'^
 *
 *•_
 N*S
 R*~Nm;m*R,,v7uP[ÆT‡YsY,,v*k<O
 ÿ
 •OO*N*S
 ÿ
 *
 *•
 7uP[*k<O
 ‡YsY*k<O
 qQ*^

$\ddot{y}^* \cdot 1 \quad 3.0\% \quad 0.8\% \quad qQ^*$

ÿ* *•2 4 8 . 2 % 2 6 . 5 % *~*~*T6R
 0 . 4 % 1 . 1 % QX™e 2 . 4 % 3 . 9 %
 Ÿ”h^ 0*s [0 . 9 % 2 . 6 % qQ*◁

ÿ* *•3 4 8 . 8 % 7 2 . 7 % 8 f 6 . 2 % 1 0
 . 4 % *e†™ N 3 . 1 % 7 . 2 % *”L^ŒT*‘ ‡
 5 . 6 % 8 . 2 % *l_/_ *~Nmƒ[6 . 0 % 1 0 . 5 %
 *N*N
 g*R 1 . 1 % 3 . 2 % Ye*€ 3 . 2 % 6 . 0 %
 kSu 1 . 6 % 5 . 8 % y)Rb–
 0 . 7 % 4 . 0 % Ye O 0 . 2 % 1 . 0 %
 ‡e S 0SO*€ 01ZPN 0 . 6 % 0 . 9 % *[cO 0 . 4 %
 2 . 0 % ?eœ^ 6 . 1 % 6 . 6 % qQ*◁ 1 0
 0 . 0 % 1 0 0 . 0 % eg n ÿ*~Nm*

ÿ 01 9 9 5 t^*~*ϵt^t’

0 0

6 7 . 6 . 6 % „v‡YsY(W?eœ^* *•1\ N

ÿ7uP[:N6 . 1 % 0nc1 9 9 3 t^t^•^,,v N*N*bh^

ÿ(W R/efe*X{v?eœ^* **−XT-N

ÿ‡YsY`S4 1 ÿ 0FO/f

$$\ddot{y}(W|Q\epsilon^*-X\text{T-N}$$

ÿ‡YsY`S8 7 ÿ 0?eœ^* *,v‡YsY*k<O*Seu*šŽN R/efe*X{v*S R*~Nm;m*R*
N*S;`pe-N,,v‡YsY*k<O 0

T*y%,, O N,,v*`*Q N7h

ÿ(W?eœ^* *•-N

ÿ‡YsY,,vL€*R*~+RNOŽN7uP[0*ç,Y T*S 0 Y b*y*[# *N*N*S*S*I* *•-
*NI{L€*R*QNNhQ* 1u7uP[*b*N 0*S g Y*N* *•
g‡YsY*b*N*š*~L€MO

$$\ddot{y}^*k \prec O$$

NyY*N(Wte*N?eœ^* *-N,,v*k<O*c* 0

h^1 1 *b*N?eœ^* *• T*yL€*R,,v‡YsY*k<O(1 9 9 3 t^)
L€*R qQ*˘ ‡YsY 7uP[‡YsY ÿ qQ*˘ 4 3 4 1 8 0
2 5 4 4 1 % |QL€*]O 6 0 5 2 8 8 7 %
žRIQ*[# *N 8 1 7 1 3 % *S*~
*N 2 7 0 2 7 0 % * *•
*N 5 0 5 0 % *S*1 ÿ NL€
ÿ 8 0 8 0 % *h*[b–
3 1 2 3 3 % Y*N* 1 3 4 9 3 1
% vQ-
N O*V*V • 5 2 3 4 0 % *S*~* *•oRKb 1 1
2 9 1 8 %
6 8 . ?eœ^ a*˘OR* *N*•~~ 0

Ndk

T*e

ÿ(W*N}T*eckŠ egŠ Y0W €Q†‡YsY 0\$N*N* *•-

*N,,vL€MO 0 N*N*S # *N,,vL€MO*N*S*h*[b–
,,v N*NLEMO1u‡YsY*b*N 0 g\$N

T‡YsY*b*N†N R/efe*X{v{š Y'Y O 0(W*e*S R*)\O,,v*N-N‡YsY*k<O_N

N*ežX R 0FO/f

ÿ

N O^*_*%Heœg 0*V:NL^?e* *•,,v*NXTAm*R'^

N'Y 0

6 9 . 1 9 8 7 t^,,v Œ*g_N nZi0Wh^

f'Y* R‡YsY*N<N^—hQ*e*]\O 0(W8 9 9

T^—hQ*e*-XT-N

7 3 1

T:N†YsY

ÿ`S8 1 . 3 % 0

h^1 2 c'+RÆTL^ N R R,,v^—hQ*e1\ N*`*Q

ÿ1 9 8 7 t^

^—hQ*e*—

XT,,v*k<O 7u sY 8 . 2 % 1 8 . 7 % 8 1 . 3 %

eg n ÿ*~Nm*

ÿ 01 9 8 7 t^ Œ*g
0 0

7 0 . * 2 0 ÿ,,v‡YsY*N<N^—hQ*e6R*]\O 0

€7uP[,v* N*k<O \—_< * ŽN*- 0*Vdk

ÿ7uP[*N<N^—hQ*e6R*]\O*N

NnfM

ÿ

€^—hQ*e6R*]\O*[‡YsYeg*◁ R/f N*y^_nfM „v1\ Nb_ _ 0

h^1 3 *] N* *•-N7usY„v1\ Nb_ _{|+R

1\ Nb_ _{|+R 7u sY hQ 9 7 . 6 % 8 0 . 8 %

^—

hQ*e 2 . 4 % 1 9 . 2 % qQ*◁ 1 0 0 . 0 % 1 0
0 . 0 % eg n ÿ*~Nm*

ÿ 01 9 8 7 t^ E*g

0 0

7 1 .

T7h

f>f,,v/f^—hQ*e6R*]\O*[*]ZZ‡YsY gg8T _>R 0*N<N^—hQ*e6R*]\O,,v@b
g‡YsY-N*]ZZ €`S6 7 %

ÿ

€(W*N<NhQ*e6R*]\O,,v‡YsY-N*]ZZ‡YsY*k<O*S

g3 0 . 8 % 0US*Ž‡YsY,,v*`*Q R*v*S 0

7 2 .

T7h*N*NatQ* „v/f

ÿ*[lQ*S:N‡YsY* /f:N7uP[*c>O^—hQ*e6R*]\O:g O* *N*•~~,vT{
 Y 0*∠0O*~æg

$$N^*S^*\epsilon \quad \text{---} \quad \%_0^{\wedge}\text{---}hQ^*e6R^*]\backslash OL\epsilon^*R,,v^*k\lhd O^*esQ$$

ÿ

$\epsilon/\hbar^2$

fÿS R N*S*€ 0gag*N,,v*S*€ b

N*S*€:N7uP[ÆT‡YsY*c>O^—hQ*e6R*]\O,,vlQ*S-N7uP[ÆT‡YsY,,v*k<O 0FO/f

$\ddot{y}_->f6q$

ÿlQ*S*{ tB\[7uP[ŒT‡YsY/f

f>f:S+R*[..._,v 0*S g5 . 9 % ,,v‡YsY*S*–ŽN
N*S*€:N‡YsY*c>O^—hQ*e6R*]\O,,vlQ*S 0*v*S

ÿ3 6 . 9 % „v7uP[*S*–ŽN

N*S*€:N7uP[*c>O^—hQ*e6R*]\O,,vlQ*S 0;`„veg*◁

ÿ9 0 ÿ*N N,,v‡YsY*S*–ŽNŸS R N*€Y*c*S‡YsY^—hQ*e6R*]\O,,vlQ*S 0

€7uP[,,v*v”^*k<O/f6 2 . 2 % 0

h^1 4 c7uP[ÆT‡YsY^—hQ*e6R*]\O*S*€'\ R R,,v*] NlQ*S-
N,,v7usY*k<O

^—

hQ*e6R*]\O 7u sY *S*€ 3 7 . 5 % 5 8 . 7 %

gag*N,,v*S*€ 2 4 . 7 % 3 4 . 7 %

N*S*€ 3 6 . 9 % 5 . 9 % *l gT{

Y 0 . 9 % 0 . 7 % qQ*◁ 1 0 0 . 0 % 1 0 0 .

0 % eg n ÿ*~Nm*

ÿ 01 9 8 7 t^ Œ*g

0 0

7 3 . *~8^*_*_„v N*N*•~/fsQŽN

T*]

Tl',v %oBl 0(W1 9 8 7 t^',v E*g-N

ÿnc*bJT

$\ddot{y}$

Nu^*_-

T*]

Tl‘ÿS R,,vHh<O*S`S*~3 ÿ 0 t1u T*y T7h ÿ‡YsY
N”^ N Y*s ÿ;m*Y*‘

ÿ‡YsYr^

N†N ÿ‡YsY

N*€*c>OaƐ7uP[N7h,,v*N*Q ÿ‡YsY*^ RM‘\O

N

T,,v*]\O ÿ{Q*[*|*S,,v7uP[*]D *šŽN‡YsY 0*e*lnxš[N* *~œg/f&T&{ TĸNž[
0* \ (W?eœ^* *•

$\ddot{y}_1 \ 9 \ 9 \ 4 \ t^\wedge$

ÿ 0~[XTŒT*-XT*...*‘*N

0*%š[*[7uP[ŒT‡YsY N*%š

$$T^*N \cong 0$$

$$7 \cdot 4 \cdot N^* \cong \mathbb{C}^* g^* h^*$$

f

N7uP[*v*k

ÿsY*-XT*N YŽN g:N

N)R,,v0WMO

ÿ(WKfGS*eb—

ÿ‡YsY,,v:g O

N0R7uP[,v NJS 0

h^1 5 c‡YsYKfGS:g O R R,,v*] N* •*–XT*k<O

7uP[KfGS,,v:g O * ›NlQ*S,,v*–XT*k<O

g 3 8 . 2 % gFO g*OYu a*%o 1 1 . 5 % *l

g 4 8 . 8 % *l*VT{ 1 . 4 % qQ*‹ 1 0 0 .

0 % eg n ÿ*~Nm*

ÿ 01 9 8 7 t^ Œ*g

0 0

7 5 . ‡YsY*S`S*S R*~Nm;m*R*N*S,,v'Y*~ N RKN N

ÿ

€ NL€*RNO

$\ddot{y}^*]D \quad \setminus \quad 0FO/f$

ÿ‡YsY(W1Y N*NXT-N,,v*k<OtS*vS_*š 01 9 9 6 t^1 1 g•^

ÿ1Y N‡s:N1 . 4 % 0(W;`*¿3 7 3
T~b*]O,,v*N-N

ÿ2 0 9 *N(5 6 %) :N7uP[

ÿ1 6 4 *N ÿ4 4 ÿ ÿ:N‡YsY 0(W1\ N ^:W N

$$\ddot{y}^*l \quad g \in b/g, v^*R^*R \triangleright R \quad g^*-\sim b^*]\backslash O$$

ÿ*Vdk‡YsY*S0R,,vq_*T<h Y%N*‘ 0

‡YsY

N?e*1

7 6 . * 1 9 9 4 t^nx*z‡YsY*N

g(WhQ*V N*~•bhy,,vCg)R*Neg

ÿ*QV{'?e*!g,,g-N‡YsY*k<Oeu gžX •

ÿFO/f

ÿ7uP[*N6q YŽN

$$f>f_{,v};N^*[0WMO\ 0^*S\ g(W?e\alpha^{\wedge}\ N^*\sim\ddagger YsY_{,v}^*k\langle OMb^*\ 0R4\ 0\ \ddot{y}$$

ÿ5

T?eœ^ bXT-N

ÿ‡YsY`S2

T 0?eœ^—™*vœT?eœ^oR—™*v,,vMOn GW1u7uP[*b*N 0

h^1 6 ‡YsY(W?eœ^ 0*œ OœT1 1 *NL^?e:S:S*œ O,,v‡YsY*kœO
:g,,g bXT 1 9 8 5 1 1 9 9 5 2 ?eœ^ 5 0 %
4 0 % *œ O 2 5 0 % 8 % :S*œ O 1 0 6
3 % 1 5 % eg n ÿ*~Nm*

ÿ 01 9 9 5 t^*~*ᵹt^t’

0 0

1 *Ng ÿ*ᵹ O/ ?eœ^1 9 8 5 - 1 9 8 9 t^ ÿ:S*ᵹ O1 9 8 3 -

1 9 8 7 t^ 0

2 *Ng ÿ*ᵹ O/ ?eœ^1 9 9 3 - 1 9 9 7 t^ ÿ:S*ᵹ O1 9 9 5 -

1 9 9 9 t^ 0

7 7 . *l gsQŽN T?eœ^*S:S*YXT OwQg*T*ᵹ b

T*ewQ g*QV{D <h,,v7uP[CE T‡YsY,,v*k<O,,v*~*<peW[0FO/f

$$\ddot{y}_9 hnc - a^* b_7 h \text{ } \mathbb{E}^* g$$

ÿ*S*ç:N*~*[*N7uP[:N;N 0

7 8 . *N7u':N;N,,v*`*Q(W?eZQ-N_N^_

f>f 0\$N*N;N %ohQ*V``?eZQ(Vy*VT€*vÆT*o* lQ lZQ) „v-
*NGW:N7u'` 0*S*>m* 1u
TUS„v†~*[B\7usY* g 0

h^1 7 *b*N?eZQL€*R„v‡YsY*k<O
L€*R 7u sY ‡YsY*k<O ?eZQ†~*[1 8 9 3 3 %
Vy*VT€*v†~*[7 3 3 0 % *o* lQ lZQ†~*[9 3
2 5 % * 1u
TUS†~*[1 2 3 6 0 % ZQ;N-
^ 2 0 0 % eg n ÿZQ>m Æ*g 0
1 * 1u
TUS„v†~*[*y:NS p r e c h e r I n n e n r a t 0

7 9 . 1 9 8 2 t^

ÿ(W\$N*N;N %o,,vhQ*V'`?eZQ...Q* b*z†N‡YsY*~*~ 0‡YsYT€*vÆT*o* lQ
lZQ‡YsY* \$N*N*~*~,v*v,,v* /f O‡YsY*f*y g0W*S

N?e*1

ÿ _U\Ye*€*]\O

ÿ*[*c*šlQ O*^*^*N*S*O* (W?e*l-

N €Q†0R‡YsYsQ*__,v*•~\O*Q†N! .s 0yr+R/f

ÿ* >N?eZQ>m*~*~* :N‡YsY*c>O†N*b*N?e*lL€*R*eb—,v*W*˂ 0

8 0 . R/efe*X{v*l

g:_6R'`*%š[‡YsY*k˂O 0* 1uZQ/f*%š[ZQ>m†~*[S p r e c h e r I n
n e n r a t ‡YsY*k˂O,,v/U N?eZQ 0

‡YsY,,v>y O0WMO

8 1 . 1uŽN7uP[(W*~Nmu;m-N,,v0WMO

N*e R:_

ÿ*S*NGPš[

ÿ1\6eeQÆT" *N@b gCg

€ Š

ÿ7uP[,v0WMOnfM *šŽN‡YsY 0FO/f

ÿ*1 g gsQ R/efe*X{v6eeQÆT" *N*`*Q,v*~*⟨peW[0(W*~ b*•~~ N

$\ddot{y}^*N^*N \quad n$

$N \quad Q^*l(u \quad OHQ \quad \epsilon Q \dagger 7u' \wedge$

$$T^*N_{,,v} \, O^* \sim^* \langle O$$

$$\ddot{y}^*Vdk$$

$\ddot{y}^*N \cdot^* eg$

w

ÿ7uP[

N‡YsYKN*(W" *N@b gCg*eb—,,v*]* O n) \ 0

8 2 . 9hnc*~*O*ζ,,v 01 9 9 3 t^ZZ*Y*l

0,,v*%öš[RM‘D *N

ÿ O‡YsY,,v0WMO—_0R9e,,U 0* \1\6eeQ

€ Š 0FO/f

ÿ7uP[

N‡YsY(W*~Nmu;m*eb—,,v*] _*N6qX[(W 0* /f1uŽN7uP[

$N \nmid YsYZ \quad *S6eeQ,,v*\epsilon \rangle R$

N

ÿ7uP[*S0R*f}Y,,v N NYe*€

$$\ddot{y}^*b^*N^*f^*\check{s},,v^*]\backslash O L\epsilon^*R\quad 0\quad \backslash^*g^*g$$

$$f^* \quad *N^* \bullet \sim (W \quad Y'Y$$

$$z^{*\wedge} \quad N/f1u\check{Z}N$$

T*]

N

Tl' b,,v 0FO/f

ÿ

NvQ*N*V }*v*k

ÿ* *N*V }@bw „v\O(u*S*€/f!k %o„v 0

8 3 .

1uŽN*vMR;N %o9hnc*ˆ,Y6eeQ 0" *NÆTCg>R* {|*V }nxš[>y O0WMO

*šNO

$$\ddot{y}^*Vdk$$

ÿ7uP[,v>y O0WMO 8^*šŽN‡YsY 0FO/f

ÿ g*‘ %o,,v>y O*N*RKN N/f * *[*^Œ[b,,v>y OA~M^*N*R 00R*vMR:N
bk

ÿd-†NvP *~^N*S4Y b*◁*N Y

ÿ*[* y~*N*R((S*b*[*R*R*R 0gq™eÆTšb{QP[sY((*g*~^NvQ”^
 g,,v0WMO 0*[*N*N*[*R*R*RÆTšb{QP[sY*]\O
 N”^*N*N*~^NaÆ _'`,v b*ç

ÿ

$$\epsilon''^{\sim N} f_{Y,v} b^{\ast}_{\epsilon}$$

$$\ddot{y}^* / f^* N$$

$$T_{,,v} \sim N y^* \epsilon^* \% * N^* R \quad 0$$

Ndk

T*e

ÿ* /f\O0R†N(W>y O*Oœ—*z*]-N S*b*[*[*R*R*RcETšb{QP[sY,,v b*¿,,v 0
 8 4 .
 \hQ* *|>R b* R*|>R>e(W*[*R*R*R N,,v‡YsY*N YŽN g:N
 N)R,,v0WMO 0yY*N*1 g*N*N6eeQ

ÿ b6eeQNOŽN7uP[

ÿ6Rš[N N*SU*Ꞥ R*f:N*V*—

ÿ

€ N{Qd`**eHh*%š[gNOP-^6eeQ4ls^

ÿ* OyY*N YŽN

N)R0WMO

ÿ*V:NyY*N*~8^*N<N^—hQ*e6R*]\O 0

N*</f(W>y O N* /f(W*[*^...Q*

ÿ*V:N*S0R*e,,v*%or,!j _,,vq_*T

ÿ N*e*

N*€*c*S

$$T^*e|Q^{\sim*}[*R^*R^*R$$

N gl'1\ N,,v\O*1 0

8 5 . (W* *eb—

$$\hat{y}_- = g/T^*S - a \ln_{,,v/f}$$

$$\ddot{y}_1 \approx 9 \cdot 8 \cdot 7 \cdot t^*[lQ^*S^* \cdot L^{\wedge},_v \cdot Ny^{\sim} \cdot \mathfrak{E}^*gh^{\wedge}$$

f*S g'Y*~2 0 ÿ,,v*-XT(W*€Y €Q†*y g*O* (W,glQ*S|i
,*N...Q b*N Y*^*zXb?Q*^*e,,vlQ*S1\ N 0*Vdk

ÿ8 0 ÿ,,v*] N* **~XT/f*NGPš[*N*N,,v*-;N*[*O* Xb?Q*•~
NatQ*

$$\in L^{\wedge N, v} 0^* h^{\wedge}$$

f

ÿ

$N^* \sim N m : R^* o^* v^* k$

ÿ>y O*[?Q*zÆT*[*^*•~@b*~^N,,v0WMO 0

8 6 . [* [*^ N*◁,,v t*‰”^

N*N*NP–ŽN O*~,,v*S*N*[*^ 0* ”NASt^*N*Neg

$$\ddot{y}^{\wedge}-ZZuP[sY,,v^*k\lhd O\quad ek\check{z}X\ R\ 0,Y^*N(W\ R/efe^*X\{v$$

ÿ*QNN*k1 0 *Ni[P[-N1\ g N*N^—ZZuP[sY 0FO/f

ÿ*N*~*⌊peW[

w

N*Q* /f*QŽN* *%o* ?a,,v*Qš[

$$\ddot{y}^* / f h^{\wedge}$$

fck(W*Q*s N*y‡YsY*e*v*r* b*b# *N,,v>P T

$\ddot{y}$ $b^*<:NyY^*N''^{\wedge}r^*$ $b^*b\{Q^*[*|^*S^*S\check{b}\{QP[sY,,vhQ^* \# \ ^*N \ 0$

$h^{\wedge}1 \ 8 \quad ;m^*N \ 0^{\wedge}\text{---}ZZu\mathfrak{E}T\{k^*\mathfrak{E}^*k\mathfrak{O}$

$t^{\wedge}^*N \quad ZZu \quad ^{\wedge}\text{---}ZZu \quad \{k^*\mathfrak{E} \quad qQ^*_{\mathfrak{C}} \quad \quad 1 \ 9 \ 5 \ 0 \ -$

$1 \ 9 \ 5 \ 4 \quad \quad 9 \ 5 \ . \ 5 \ \% \quad \quad 3 \ . \ 1 \ \% \quad \quad 1 \ . \ 4 \ \% \quad \quad 1 \ 0 \ 0 \ \%$
 $\quad \quad 1 \ 9 \ 6 \ 0 \ -$

$1 \ 9 \ 6 \ 4 \quad \quad 9 \ 5 \ . \ 1 \ \% \quad \quad 4 \ . \ 0 \ \% \quad \quad 0 \ . \ 9 \ \% \quad \quad 1 \ 0 \ 0 \ 0 \ \%$
 $\quad \quad 1 \ 9 \ 7 \ 0 \ -$

$1 \ 9 \ 7 \ 4 \quad \quad 9 \ 3 \ . \ 9 \ \% \quad \quad 5 \ . \ 6 \ \% \quad \quad 0 \ . \ 5 \ \% \quad \quad 1 \ 0 \ 0 \ 0 \ \%$
 $\quad \quad 1 \ 9 \ 8 \ 0 \ -$

$1 \ 9 \ 8 \ 4 \quad \quad 9 \ 3 \ . \ 9 \ \% \quad \quad 6 \ . \ 1 \ \% \quad \quad 0 \ . \ 0 \ \% \quad \quad 1 \ 0 \ 0 \ 0 \ \%$
 $\quad \quad 1 \ 9 \ 9 \ 0 \ -$

$1 \ 9 \ 9 \ 4 \quad \quad 9 \ 1 \ . \ 0 \ \% \quad \quad 9 \ . \ 0 \ \% \quad \quad 0 \ . \ 0 \ \% \quad \quad 1 \ 0 \ 0 \ 0 \ \%$
 $\quad \quad eg \ n \ \ddot{y}^*\sim Nm^*$

ÿ 01 9 9 5 t^t^t'

0 0

8 7 . *~Nm

g*R* *YXb* L^,,v Ny~ xvzh^

f

ÿ1 9 9 2 t^ R/efe*X{v'Y*~ g4 4 0 *NUS*N*[*^ 0vQ-N

ÿ9 1 ÿ,,v7b;N:N‡YsY

ÿ9 ÿ,,v7b;N:N7uP[0*gZZUS*N`S2 4 ÿ

ÿ RE\ €`S2 9 ÿ

ÿ*yZZ €`S3 8 ÿ

ÿ'NvP €`S9 ÿ 0US*Ž*k*N,,v6eeQNOŽNUS*Ž6r*N 0US*Nb—

4N*◁ Y*•~~ ÿ◁N N*SU\ 0gqTMeP[sY 0*^>y O’c*e(W Y 0*~Nm OV ‘`*N*

SOO?bag*N*]I{ 0*◁ xvz* h^

fUS*Ž*k*Nb—4N+ *V,,vqSi-'\` g'Y 0

8 8 . NAST^*N*Neg

ÿ*yZZ*k<O'YE^*^žX R 01 9 9 0 t^

ÿ3 . 2 % „v‡YsYŒET2 . 6 % „v7uP[:N*yZZ € 0FO/f

$$\ddot{y}^* < P_{-1}^* a_{v/f}$$

$$\ddot{y}=\backslash{*}\{*Q*sZZ*Y6R*^*l\check{[mp*N,,v\ T*y,,\sim\ \check{S}$$

$\ddot{y}^* \quad *QAS^{\wedge}eg$

$\ddot{y}^* \sim ZZ, v^* N_{pet} S(W$

$N^* e \check{X} R \quad 0 \quad N A St^{\wedge} N$

ÿ*~ZZ,,v7uP[ŒT‡YsY*S`S*~ N RKN N

$\ddot{y}]NAs^t^*N$

ÿ* *N*k<O* * ... * †N4 0 ÿ 0,Yæg S*b'NvP € * ›N*Nv^^—
 * ?a1Y*S*]ZZ0WMO * HN* *NpeW[ž[E– N* 0R*~5 0 ÿ 0

h^1 9 *N*S,,vZZ*Y*r*Q

US*Ž	*]ZZ	'NvP	*yZZ	t^*N	7u	sY	7u	sY	7u
sY	7u	sY	1 9 3 0	6 4 . 2 %	6 0 . 9 %	3 1 .			
8 %	3 2 . 0 %	3 . 8 %	7 . 0 %	0 . 1 %	0 .				
2 %	1 9 4 1	6 0 . 3 %	5 6 . 8 %	3 5 . 9 %					
3 5 . 3 %	3 . 5 %	7 . 5 %	0 . 3 %	0 . 3 %					
1 9 5 0	5 7 . 6 %	5 5 . 6 %	3 9 . 0 %	3					
7 . 1 %	2 . 9 %	6 . 9 %	0 . 5 %	0 . 4 %					
1 9 6 0	5 7 . 0 %	5 5 . 1 %	4 0 . 4 %	3 7 .					
5 %	2 . 4 %	7 . 0 %	0 . 2 %	0 . 3 %	1 9				
7 0	5 5 . 0 %	5 1 . 8 %	4 2 . 0 %	3 9 . 8 %					
1 . 7 %	7 . 2 %	1 . 3 %	1 . 2 %	1 9 8 0					
4 9 . 6 %	4 6 . 6 %	4 7 . 1 %	4 3 . 3 %	1 .					
4 %	8 . 0 %	1 . 9 %	2 . 0 %	1 9 9 0	4 8				
. 6 %	4 4 . 5 %	4 7 . 6 %	4 4 . 4 %	1 . 2 %					
8 . 0 %	2 . 6 %	3 . 2 %	eg n	ÿ*~Nm*					

ÿ 01 9 9 5 t^*~*ϵt^t’

0 0

8 9 . (W*[E\,,v*`*Q

N7usYKN*•>f*Q g

$$f>f_{,,v^*}]+R\quad 0^*[\sharp Y;\`/f\quad Y\check{Z}N^*\mathfrak{ae}+Y\quad 06q$$

€

$$\ddot{y}^* \quad ASt^{\wedge eg}$$

ÿ*œ+Y,,v*k<O*] g@b

NM-

ÿ*[‡Y,,v*k<Ož[E– N N*v*O c(W8 % ,,v*k<O N

ÿ* ;N %o/f1uŽN‡YsY,,v,,~-

gÿ[}T'Y'Y*c*š,,vŸS*V 0* *[Y tgqTMe €*N*]\O,,v?eœ^*~*~ÆT^—

?eœ^*~*~*c*Q†Nyr+R,,v c b 0

9 0 . (W* *eb—

$$\ddot{y}^*S \quad N^*N_{yr}+R^* \quad \%_{o,,v^*}\bullet^{\sim\sim}/f$$

ÿ9hnc>y O(N*R* „v Ny~ Æ*g>f:y

$$\ddot{y} \in t^{\wedge \dagger} YsY, v^*y^*, \mathbb{E}T6eeQ^*k \quad \in t^{\wedge 7}uP[, v^*y^*, \mathbb{E}T6eeQ$$

$$f>f_{\nu}N_0\ast\ast[US\ast\check{Z}\mathfrak{E}T\ast\sim ZZ_{\nu}\ast Neg\ast\mathfrak{c}\ast\ /f\ N7h_{\nu}\ 0$$

$$9\ 1\ .\qquad N\ast N\ \backslash\ast g\sim b0R\ast\%_0\ast\mathfrak{Y}S\ast V_{\nu}\ast\bullet\sim/f$$

ÿ(W*Q*s‡YsYŠ egŠ Y0W*S R g6e*vL€ N,,v< *R

T*e

ÿ7uP[*S R*[*R*R*R,,v*`*Qv^*l gžX R 0 N*eb—

ÿ gP[sY,,v‡YsY*S R*~Nm;m*R'Y'Y0WžX R†N* *Ž,,v *b

ÿdk{|#YsY 8^f

N

T N+Y R*b* *y *b,,v 0*S N*eb—

$$\ddot{y} = \%*N \ Y* \ *[\sim bgq^{TM}e*[*R\mathbb{E}TP[sY,,v\check{z}R*]$$

$$\ddot{y}, Y^{*[*^{\wedge}.^{\wedge}*]}\mathfrak{E}T4N^{*}e.^{\wedge}*Ri[P[,v^{*}N(\quad Y:N\ddot{Y}''^{*}p^{*})] \quad b^{*}\lhd^{*} \ E\backslash \ b^{*}N^{*}S.^{\wedge}*R \ 0 \quad 8^{\wedge}$$

$$dk^{*}y \ Y^{*} \ .^{\wedge}*R\mathfrak{E}T \quad gsQ,,vQ \ \ ^{**}\sim_{\{ \sim 1ugP[sY,,v\ddagger YsYeg^{**}\sim^{**}\sim \ 0$$

€ 8^/f‡YsY*c>O*[*^.*^]I{b_ _,,vdk*y

g*R 0* *‘X[(W@w N*N S*b N*eb—,,v*•~~ 0,{ N

ÿ* ›N*N@bZP,,v*]\O€_€_*l g*NHN*...l‘ b*...l^_ \

$\ddot{y}^*QNN_{-}$

$N0Rck_{-} b^* \lhd 0, \{ \mathbb{C} \mathbb{N}$

ÿZPdk*y*]\O YJS—_

N0R>y O*Oi—

ÿ*Vdk*c>Odk*y

g*R,,v*N b*b@w Nš[,,v*~i- 0,{ N

ÿ‡YsY # gqTMe*[*^ⒺTP[sY,,v O*~*%or,b_aⒺ*l g*NUO9e*S 0
 9 2 . — %o _U*]\O

ÿ N*eb—/f:N†NSb4x7usY O*~,v*%or, R*]

ÿ*S N*eb—/f:N†Nnx*O*l_ *%š[,v>y O*Oœ—”^ib*S*N<N*[*^
 g*R,,v‡YsY 0*v,,v”^/f \dk*y*]\Ol *S b:NlQ*^,,vL€ N

$$\ddot{y}^*[\sim b^*e^{\ln x}O:N\dagger N^*_{-};N\mathbb{E}T^*-XT,,v)R^*v$$

ÿsS O(W NᵝN*[*^ZP*⌢*e*],,v*`*Q

N_N/e*N*_ %o,,v>y O*Oœ—*‘ 0

z]*%öš[

9 3 . 1 9 7 8 t^ R/efe*X{v b:N'k2m tᵝN O,,v bXT

ÿ1 9 8 2 t^ R/efe*X{vyb*Q†N 0'k2m*O*b*NCgET*W,g* 1ulQ*~
0 0 R/efe*X{v(W1 9 9 0 t^ ReQT€ T*VKN

$\ddot{y}_N \quad b^*b^\dagger N \quad 0^*[*z$

$0^*\% \check{s}[,,vIN^*R$

ÿvQ-N S*bhQb—

Ngk*%oŸS R

ÿyr+R/f*WŽN'`+R,,v

Ngk*%ŸS R 0 R/efe*X{v1 9 9 5 t^ ReQ†N 0^md–

[‡YsY N Rb_ _gk%lQ*~

0

$$\ddot{y}^*N$$

$$\begin{aligned} \epsilon^* \quad & \text{Nek}^* \text{c}^* \text{R} \dagger \text{N} \check{\text{z}} [^* \text{s} 7 \text{usYs}^{\wedge} \text{I} \{, \text{v}^* \} \backslash \text{O} \quad 0 \\ & 9 \quad 4 \quad . \quad \quad \quad ^* \sim ^{\wedge} \text{N} \ddagger \text{YsY} \quad > \text{NCg}, \text{v}^* \text{R} \rhd \text{R}^* \text{S}^* \text{N}^* \quad ^* \text{n} 0 \text{R} 1 \quad 9 \quad 6 \quad 5 \quad \text{t}^{\wedge} \end{aligned}$$

ÿ1 9 6 5 t^*_*•~~,{ N!k(W*◁ O-N—_0R*_*◁ 06q

€1 9 7 1 t^(W N!klQ l•bhy-N

ÿ*~‡YsY >NCg*•~m *_1_ Ype*b*~ 06q

€

$$\ddot{y}(W^*V...Q?e^*l-N^* \ v^{\wedge\wedge} \text{---}/f^*_{\text{<}} * \bullet^{\sim\sim} \text{,,} v^*_{\sim} *_{\sim}$$

ÿ(W1 9 7 8 t^ R/efe*X{v b:N'k2m t«N O bXTKN

ÿ'k2m t<N O_N N Qyb*ç

N*~^N‡YsY >NCg,,v*•~~ 0(W*e(W1 9 7 6 t^1\ (W N>N>y:S*c*Q†N‡YsY
>NCg,,v*•~~KN

ÿ g

$$T^*\sim \check{Z}N(W1\ 9\ 8\ 4\ t^{\wedge}$$

ÿ9hnc* NeklQ l•bhy

ÿ†YsY g

$$T^*S_{-} \nmid N(W^*V^*[N^*_{\sim, v} > NCg \ 0$$

$$9 \ 5 \ . \quad (W^*[*1 \ f^*V \dots Q$$

ÿ9hnc 0*[*l

0,{3 1 ag

ÿ* 1 9 7 0 t^*Neg@b g*V l(W*I<_b—

MR* /fs^I{,,v 0*< O1 9 7 1 t^*%oš[

ÿ *V l *| c*b g R/efe*X{vlQ l*Ž*N,,v@b g*N

ÿ

N*{vQ`+R,YUO 06q

€

ŸŽ[E– N* *

N*€EQ Rnx*O7usYs^I{ 0*S

g(W1 9 9 2 t^ * *N)YŽ[*e,,v*[*lag>kMb;`0W*%š[Ž[L^7usYs^I{ Ÿ*ag
* *%š[

ÿ \ * *O*◁*z*l O*s
 g*l◁&{ T* NŸS R 01* 7h:N7usYs^I{`Yš[†NhQb—,,v*l◁*W@x 0

L^?e* *•
 9 6 . 9hnc?eœ^* *•*◁ R

ÿ þe S 0R—t^ŒTSO*€ * *•(*N

N*y þe SŒTs^I{

ÿR—t^ŒTSO*€* *•) # *O* 7usYs^I{ 0
 9 7 . 1 9 8 6 t^

ÿ9hnc* O,,v Ny~*^*

ÿ*◁*z†N7usYs^Cg*YXT O 0*◁*YXT O,,v7usY bXT*[I{

ÿvQL€*€ N*v/f*O* 7usY(W*z*l*eb—,vCg)Rs^I{

ÿ*O* lQ O*[* N*v h,,v*◁*◁ 0*◁*YXT O* L^†N N!k R/efe*X{v‡YsY*r*
Q Œ*g

ÿyr+R/f(W*~NmÆT?e*l*eb—,v*r*Q

$\ddot{y}v^*S$

N†N T*y*z*l

z ^ 0 Ny~*‘ ‰ b*~/f*^*z†Ns^I{Cg)RžRlQ*[01 9 9 2 t^

ÿ1uŽN: ON?e*/e c

ÿ*YXT O bXTd-,N-^*N YhQSOž L€ 01 9 9 4 t^-N

ÿ*YXT O*N*e,,v bXT*‘*e*~*^ 01 9 9 5 t^6 g-N*e

ÿ?eœ^yb*Q*^*z N*N4N*e7usYCg)Rs^I{ @\ (s^I{ @\ 01 9 9 6 t^5 g*Y>

m†N*NXT|QL€ # * N4N*e* *•,,v*]\O 0

9 8 .

1 9 9 4 t^1 g(W*V*[L^?e:gsQ*^*z†N N*N*c*š‡YsY0WMO*)\O*~
0*◁*)\O*~ R g†N?eœ^:gsQ-N‡YsY,,v*`*Q

ÿ1 9 9 6 t^ R T?eœ^*c*Q†N*c*š?eœ^:gsQ-N‡YsY0WMO,,vwQSO*c*e 0
9 9 . * /f(W1 9 9 4 t^1 g

ÿ?eœ^lQ ^†N(W*Ꞁ Š Ns^I{*[..._*V*[L^?e:gsQ7usY*]\O*NXT*Q R 0vQ-
N*%š[*bX€*NXTlQJT O(u'`+R-N'`*cž 0

1 0 0 .

* *N1 9 9 1 t^*Neg N*v T‡YsY*c>Oyr+R b*NYe*€:g O(* b a
*Ꞁ*W*Ꞁ ÿ Q1\ N ÿh^* 0 Œ\$RŒT*%*Q*Q z*Ꞁ`N*sI{) 06q

ϵ_-

$$f > f$$

ÿ‡YsY*[ib'Y b*NYe*€:g O*fatQ* 0

y%,,~*~

1 0 1 . (W* *eb—

ÿ*_{~™HQ*c*S N>N‡YsY *~ÆT‡YsYT€ T O

ÿ* >N*~*~*QAS^t^eg N*v(W R/efe*X{v,,v—[Ye 0*NS ;NINÇET>y Ou;m-
 N*S%c@w*‘ %o,,v?e*l\O(u 0

1 0 2 .

y%o,,~*~ N*v/f*O* R/efe*X{v7usYs^I{?eV{,,v N*N*‘ %o*c*R>R*‘ 0
 (W*e‡YsY* *R*eg

ÿ1uŽN(WlQ l•bhy-N&T*Q†N‡YsY,,v >NCg

ÿ1 9 9 1 t^*^*z†N‡YsY*]\O*~ 0*]\O*~:N* *]6Rš[†N‰N*S -
wck,,vCg)Rs^I{ ,v*v h 0*]\O*~*[*z*IfHh*Sh^ a*‰o

ÿ(W*^*z”^%`;S—uQ *eb—*S%c†N\O(uv^>NžR†N T*y*bJT O 0(W‡YsY*S—_
>NCgKN

$T\$Nt^{\wedge}$

ÿ1 9 8 6 t^*%ce†N‡YsY*]\O*~ 0

1 0 3 . :N(Wž[*s‡YsY >NCg*eb—*S—_ z4x

ÿ1 9 8 1 t^ b*z†N

awŽ *N

* *R 0(W*v hž[*s*N

ÿ1 9 8 4 t^*%oœ†N*œ *~ 0

1 0 4 . 1 9 8 2 t^\$N*N;N %œ*V*[*eZQ*S—_^—

8^;m* v^*^*z†N‡YsY *~((Vy*V

T*v,,v‡YsYT€*vÆT* eklQ lZQ,,v* eklQ lZQ‡YsY 0vQ*v,,v/f*c*š‡YsY*[*e*l,,
vtQ* v^*Nh^‡YsY,,v?e*l)R*v 0
1 0 5 . 1 9 8 5 t^ b*z†N*t\gyQ0W:S]*_>y*OPN*

ÿ1 9 9 1 t^ b*z†NL€ N‡YsY y)R’N*R*VE–OS O

ÿ6q

T*S*^*z†N N>N*ř*~ b*r*z0WMO,,vL€ N‡YsY*S R,,v*OPN* 0* ›N*OPN*
/f R+RŽN1 9 1 9 t^ŒET1 9 2 1 t^ b*z,,v]*_>yŒETL€ N‡YsY y)R’N*R
*VE–OS O,,v0W*e R/e:g,,g 0 R/efe*X{v‡YsY
g*R*OPN* *[‡YsY,,v*SU\y~*v*c>OD *R 0
1 0 6 .
1 9 8 5 t^ b*z†N‡YsYYe*€*]\OOS O 0*<OS O*c>O†N N*N*NAm*
~ŒšŒET
w*],v*‹[W

ÿ*~8^>NžR gsQ*N*N 0L€ N 0Ye OÆT?e*I*eb—

„v*bJT OÆT*W*^*s of[* Š egŠ Y0W*[*p*•?e*I*•~~*Sh^

w*I 0

1 0 7 .

1 9 8 6 t^*^*z†N‡YsY*Oo`ÆTT€*~Q 0vQ*v,,v/f*O* ‡YsY’N*vT€|
ÆT*NAm

w*I 0*^T€*~Q * *c>O

gsQ‡YsY(W;Sf[0‡e S 0*I_ÆT?e*I|†~*W*^*•~~,vD ™e 0*^T€*~Q (WX[(
Wg*•

Nbk N!k0W*c*R*^*z†N*c*š‡YsY0WMO,,vvQ*N:g,,g

ÿib'Y†N‡YsY*Oo`ĈTT€*~*~*~„v;m*R f*V 0*N)Y„v*[•?Q*z*∠[W 0‡YsYKN
 *[\ĈT?Q*z*eXb-N*_* /f(W‡YsY*Oo`ĈTT€*~Q „v!P*∠
 N*Nu„v 0
 1 0 8 . *[\ •?Q*z*∠[W b*zŽN1 9 8 9 t^

ÿw R*S/f N*N*c>O*eXb

g*R,,v*~*~

ÿ:N*eXb

g*R*]*NÆT*[•*c>O*]\O*N*~ 0.^*RÆT*T*◁

g*R 01 9 9 4 t^;m*R f*Vib'Y 0d-†NL€ N*N*~

g*R*N Y

ÿ*[•?Q*z*◁[W* *y g*S R†N:N*[•*c>OYe*€*T*◁ÆT* NekYe*€,v*]\O*N*S:
 N4N*e*N*NgqTMei[P[,v*N* L^*W*◁ÆT*[\~b*]\O,,v;m*R 0
 1 0 9 . * *NkQAS^t^*N*Neg

ÿ N>N?Q*z*eXb-N*_ _*Y*]\O 0(W R/efe*X{v,,v1 1 *N:S-N g5 *N:S*
gdk*y*eXb-N*_ 0(W R/efe*X{v;`*N*S-N

$$\ddot{y}^{*k_6}_{\sim} , \begin{matrix} 0 & 0 & 0 \\ 1 & 1 & 0 \end{matrix} E \backslash \begin{matrix} 1 \\ 1 \end{matrix} g \begin{matrix} N^*N^*eXb-N^*_0 \\ 1 & 9 & 9 & 1 \end{matrix} t^{\wedge}$$

ÿ(W*O*b*SP†..._‡YsYÆT?Q*zOS O,,v/e c

N _*◁†N‡YsYKN*[0* *N _*◁*Neg

Ÿ<Nž[*<

f‡YsYKN*[/f T g*V*-,,v‡YsY*c>O*c*R,,v N*N*‘ %o nS 0

h^2 0 ‡YsYKN*[,,v`S(u‡sÆT;m*R
‡YsYKN*[1 9 9 3 1 9 9 4 1 9 9 5 ‡YsYKN*[,,v*[*
[€ 2 7 2 1 3 8 R/efe*X{v*[*[€ 9 3 9
‡YsYKN*[,,v?Q*z 3 7 2 4 3 0 ‡YsY*[*()]Ype 5 4 7
7 4 1 9 2 9 ?Q*z*[*()]Ype 6 6 6 8 1 7 1 , 2
3 6 eg n ÿ‡YsYKN*[t^*^*bJT 0

1 1 1 . R a p u n z e l *k*N-N*_1 9 9 6 t^ *_Y*]\O

ÿ* *N6q/f N*N^*e,,v*~*~ 0*k*N-N*/f N*N‡YsYZ€ O*p

ÿ*e(W O gP[sY,,v‡YsY|_dk*S—_T€*|v^'N*v*c>O/e c 0

$$1 \ 1 \ 2 \ . \quad *_\{\sim_ \in c^*Q$$

$$\ddot{y} \quad N^* \quad N \succ N \succ y^* V / f1u^* p^* _ , , v \nmid Y s Y \uparrow \sim^* [, , v$$

ÿFOv^

N Nš[*^

w\O/f‡YsY*~*~ 0sQ*_*O* ?Q*z,,v y)R_N/f&{ T7uP[,v)R*v,,v 06q

€

ÿ1uŽN7usY,,v

Ns^I{ R*]

ÿ{Q*€P[sY,,v*N*R;N %o*N*~†N‡YsYeg b*b

$\ddot{y}^*Vdk \quad b\uparrow N^* \quad 7h,,vpSa\mathbb{E}$

ÿsS*eXb-N*_I{/f:N‡YsY*^*z,,v*ç*e 0

1 1 3 . :N‡YsY 0?Q*zÆT6r*N 0*N

$$\epsilon_N:N^{*}[*^{\wedge})R^{*}v$$

$$g^{*}R_{,,v'}Y^{*}\quad R\ N^{*}\quad ^{*}y^{*}N^{*}\sim^{*}\sim^{*}\quad ^{*}N^{*}V^{*}[_{--}0R''\quad ?e/e\quad c\ 0$$

$$^{*}O^{*}\quad ^{7}usYs^{\wedge}I\{_{,,v}^{*}c^{*}e$$

$$1\ 1\ 4\ .$$

$$(W\ R/efe^{*}X\{v^{*}W,g\ N\check{z}[*s\uparrow N^{*}l\lrcorner\ N_{,,v}^{7}usYs^{\wedge}I\{ \ 0^{*}N6qX[(W_{,,v}^{*}Ns^{\wedge}I\{ck(W^{\wedge}md-^{*}$$

$$z-N\ 0^{*}s(W_{,,v}^{*}l^{*}{}^{*}p/f\ \%o\check{z}[*s^{7}usY\lhd N\check{z}[\ N_{,,vs}^{\wedge}I\{ \ 0$$

$$1\ 1\ 5\ .\quad (W^{*}N$$

$$T^*Q \overset{\sim}{\rightarrow} T^*Q$$

ÿ?eœ^ \

N7usYs^I{@\ 07usYs^I{*•~~ T*y*YXT OÆT^—

?eœ^*~*~ T\O _U\ T*y;m*R*N/e cž[*s7usY<Nž[N,,vs^I{ 01 9 9 7 t^* *
eb—

„v<N `*SU\ \ S*bs^I{*l*•~y{ Y*]\O 0Sb*Q*[sYi[ÆT‡YsY„v*f>RL^:N* *R 0
sYi[Ye*€:g Os^I{U*%o 0

1 1 6 . 9e* ‡YsY(WYe*€ 0?e*l 0*~Nm-
u;m 0*[*^ÆT*OeP†~*W*r*Q„v* Nek*c*eck(W*< R6Rš[-N 0*S Y

$$\ddot{y}(W^*SU^*c^*R^\dagger\sim^*W$$

ÿ(W N>N/e*Ry~*v-N*l a†N‡YsY,,vyr+R\O(u 0
 ,{ŒN* R. sQŽN 0^md–*[‡YsY N Rb_ _gk*%olQ*~
 0 Tag>k,,v*ˆ*

,{1 ag(*ˆ*ˆ,,vš[IN[*vU_-N,,v ,i*_])
 1 1 7 . R/efe*X{v,,v*[*l b*lˆ_-N*l gsQŽN *[‡YsY,,vgk*%o
 N*ˆ,,vš[IN 0FO/f

$$\ddot{y}_1-9\ddot{y}_2-2t^6\ddot{g}_1-6\ddot{e}_{,,v}-0\ddot{[}*lag\langle O$$

$$0(W\ddot{[}*l-N_eQ\ddot{\dagger}Ns^{\wedge}\{I(Cg)R_{,,v}\ddot{Y}S_R$$

ÿvQ ^IN N,,v*c*c</f

N”^ g*[‡YsYgk*%o,,v*saE

$$\ddot{y}^*e^{\ast\angle/f^*v^*c,,v}0\quad g\quad a^{\ast\angle,,vL^*R}$$

$$\ddot{y}^* = f^* \bullet^* c_{,,v} \ 0^* e \ a-N_{,,v}:S+R \quad b_{,,v} \ 0^* Vdk$$

ŸlQ*~, {1 ag-N*%š[,vš[IN/f (u,,v 0

,{2 ag(*~*V,,vIN*R)

(a)

1 1 8 . * 1 9 9 2 t^6 g1 6 *e,,v 0*[*lagO

0

ÿ*[*l(W,{3 1 ag,{2 >k-

N ReQ†NCg)Rs^I{,,vŸS R 01 9 9 2 t^6 g1 7 *e*◁ O,,v Ny~*R*◁ %oB
l?eœ^-

g* (W1 9 9 6 t^•^KNMR T*◁ O*c*N*z*!*_ %o*OckHh,,v*^*◁ 0 –
@w1 9 9 6 t^8h*Q \7usYs^I{ŸS R*~eQ>y O*Oi–6R*^*N*S

NIQ 1Cg)R gsQ,,v<Ny~

$$\ddot{y}~R/efe^*X\{v^*S^*N^*W,g~N^{*\wedge*}\lhd:N^*]^*\sim\check{z}[*s\dag N\lhd N\check{z}[~N,,v7usYs^{\wedge}I\{~0$$

$$(\text{ b })$$

$$\begin{array}{l} 1~1~9~.~\quad~* \% o (~a~)~,~,\\ N,,v^{*}\lhd^{*}~0 \end{array}$$

$$(\text{ c })$$

$$\begin{array}{l} 1~2~0~.~\quad~1~9~9~2~t^{\wedge}6~\quad~g1~6~^{*}e,,v~0^{*}[^{*}lag\lhd O\\ 0n x^{*}z\dag N^{*}l\lhd_{*}O^{*}b~0^{*}S~Y \end{array}$$

ÿ1 9 9 6 t^ R/efe*X{v?eœ^~N*^*z†Ns^I{ NXT,,v4N*eL€MO(s^I{žRlQ*[l)

$\ddot{y}^*N^*O$

N* 1 9 8 6 t^*Neg b*z,,v7usYs^I{Cg)R*YXT O T\O

ÿ R ž[*sŸNž[Ns^I{,v*

z 0*ŸL€MO Rek*Ÿn Nt^

$$\ddot{y}^{1\ 9\ 9\ 6\ t^5}\quad g^*]g^*NEQ^*N\ 0$$

$$(\ d\)$$

$$1\ 2\ 1\ .\quad *S^*\%o(\ c\)\ ,,$$

$$N_{,,v^*\langle^*}\quad 01\ 9\ 9\ 4\ t^{\wedge}$$

ÿ?eœ^* (W*V*[L^?e*{ t@\...Q*^*z†N N*N*c*š‡YsY0WMO*]\O*~ 0*]\O*~*)(
WL^?e*{ t@\ f*V...Q*c*Q†N*c*š‡YsY0WMO,,v*c*e

ÿ?eœ^ \[** ›N*c*e R*N*[*gŒT ekž[*e 0*S Y

ÿ?eœ^(W1 9 9 4 t^* ~ ^†N*V*[L^?e*{ t@*Š N7usYs^I{..._G „v c*[
e^” 0 1 9 9 1 t^*Neg(W*V*[L^?e*{ t@\\-N

ÿ‡YsY* gyr+R,,v* *O:g O 09hnc?eœ^,,v c:y

ÿ*N<NĈET*~*~*Sck(W*b*ċsQŽNž[L^up;m*]\O*e*•,,vag<OIƒHh 0?eœ^ \ (W1 9 9
7 t^ R*ċ*ċ* N<Ny~ 0

(e)

1 2 2 .

7usY*k_ N,,vs^I{*S^*ċ:N*]*~ bŸRž[*s 0* _N/f eknx*z<Nž[Ns^I{,,v
N*N*W@x 0*[ŽN*N*N 0*~*~ blQ*Sž[L^,vgk*%o*S*‘*S*ċ_L^*R 0FOž[E–
N

$$\ddot{y}^* \quad \text{---} \quad \%{}^{\ast \ast} S^* c^* e \; R^*_{\check{z}} [{}^* ss^{\wedge} I\{,,v^*$$

$$z(\; {}^* c^* \check{s}^* \% \ddot{Y}^{\backslash} \mathfrak{E} T^* [\; O^* c^* e) \quad 0$$

$$(\; f \;)$$

$$\quad 1 \; 2 \; 3 \; . \quad {}^* \% (\; a \;) \; \mathfrak{E} T (\; c \;) \; ,,$$

$$N,,v^* \lhd^* \quad 0^* l \; g^* l \lhd \; N,,v g k^* \% \; 0$$

$$(\; g \;)$$

$$\quad 1 \; 2 \; 4 \; . \quad \quad R / e f e^* X \{ v,,v \; R^* l - N^* l \; \; g g k^* \% \ddagger Y s Y,,v a g > k \; 0$$

$$, \{ 3 \; a g (\; {}^* N C g \mathfrak{E} T^* W, g^* \; 1 u)$$

$$\quad 1 \; 2 \; 5 \; . \quad {}^* \% s Q \check{Z} N, \{ 2 \; a g,,v^* \lhd^* \quad 0 (W^* l \lhd \; N$$

ÿ*]*~ž[*s†N7usYs^I{ 0sQŽNvQ*N*c*e

ÿ*%osQŽN,{4

ÿ1 6 ag,,v*˘* 0

,{4 ag(*y g*c*e)

1 2 6 . 9hnc*[*l,{3 1 ag

ÿ,Y

T

NAQ*ϵgk*%ϱYsY N7h

ÿ_N

NAQ*◁ O..._‡YsY,,v*!◁_ N,,v

Ns^I{..._G 0sQŽN `U[0u*€ÆT{Q*€,,v*c*e

N(Wdky~*%š[KN R 0*%sQŽN,{1 1 ag,,v*◁* 0

,{5 ag(9e*S>y OÆT‡e S!j _)

(a)

1 2 7 . 9e*S7usY>y OÆT‡e SL^:N!j _,,v g

gHe,,vKb*k1\řž[*s*e8^u;m-N,,v7usYs^I{ 0(W* *eb—

ÿ*S*c*~*l a*W@xf[!hYe*€†~*W*g>N bŸR,,v;m*R 06q

€

ÿ7uP[>f6q*f R**%Ye*€ET* *O

ÿ

€‡YsY(W*g*y

z*^ N R*f R

w*‘*[..._*[*^# *N,,v O*~*%*_ 0*S Y

ÿ‡YsY*ç:N* *](WL€ N*SU\N8^8^G 0ROP*%oET*V*- 0*ç0R•^

ÿ* /f7uP[(WlQ*S-N`Sncf *š,,vL€MO

ÿ#c*S,,v6eeQf *š

ÿCg>Rf 'Y

$$\ddot{y}^*N$$

€*[* g*e P*Su7uP[OŠ ŽN‡YsY,,v*`*Q 0
1 2 8 . 1ulQ>k/e c*c>O,,v*[*^*N Y,,v*€?Q
g*R”^*S*e*O‡YsY,,v1\ N

ÿ

€

T*e*S

N

b*[?Q*z,,v*_*%o 0*V*[Ÿ*R _žR*W*^*s”^*S*O)R‡YsY*‘*e ReQ*R>R ^:W
0

(b)

1 2 9 . (W>y O*Oœ-†~*W

ÿ1 9 9 6 t^ž[L^†Ns^I{..._G „vŸS R 0d–vQ*N bægKN Y

ÿ* * asT@w*V:Nu?Q*€sY

€\Pbk*]\O,,v‡YsY*SŠb* *Qt^\O:N”^*Ꞥ O**e*•

ÿ*]ZZ+Y‡Y,,v O*‘

N Q*kUS*Ž € O**f R OšS 0

1 3 0 . 1 9 9 3 t^,,v 0ZZ*Y*l

0*OckHh*c*Q†N N>N

g)RŽN‡YsY,,v*‘ %o*e*c*e 0*s*]*N*[•6RŸS R9e*S:N O4OsQ*|ŸS R 0

d–vQ*N Y

ÿ7usYs^I{..._G S*b

TW[,v O(u 0ZZ*YCg)RÆT RE\,v

Tæg 0,Yæg*Su RE\

$$\ddot{y}ZZ^*YX[*\sim g^*\bullet\check{z}X\,R,,v''\quad *NM'\,vP^*S^*es^\wedge\,R\,0$$

$$,\{6\;ag(\;^*S\qquad N\;Rb_ _ *[\sharp YsY,,v)\;VS)$$

$$1\;3\;1\;.\qquad (W\;R/efe^*X\{v$$

$\ddot{y}^* \quad y^{\sim} \quad \%_0 B l \quad * \quad 0 \quad R^* l$

$0, \{ 2 \quad 1 \quad 3 \quad - \quad 2 \quad 1 \quad 7 \quad a g^* \quad 0 R \quad 0: N'` e R J R$

€\O*m'Z 0*b*vag(ET) VS*N*S,,v

ÿ9hnc R/efe*X{v*l_ GW{~*S0R*`Z

ÿeR:Y* 1u

$$\ddot{y} = g^* \dot{s}^* - 1 - 0 - t^{\wedge} - 0, Y_{\alpha \text{egv} Q - N} \quad N y \tilde{j} \quad L^{\wedge} / f^* \quad * V L u^* \quad L^{\wedge}, v$$

ÿ R (u1 9 9 3 t^,,v 0*l_ *c*R*l

0*%š[0*[ŽN-,7u-,sY 0R‘'T

g*RXTÆT*—PN oOY €

ÿ?eœ^(W1 9 9 5 t^ ~ ^†N*Q R

ÿ %oBl*-;Nnx*OvQL€*],,v*Ž*_eP*^ 0

,{7 ag(?e*lŒTlQqQu;m-N,,vs^I{)

(a)

1 3 2 . * 1 9 8 4 t^ _*Y‡YsY,,v•bhyCg—_0R*Oœ- 0

(b)

1 3 3 . (W?eœ^ 0*◁ O 0aNIQ@bŒT T*YXT O-N

$\ddot{y}^*$

N

T

$z^{*0}W \quad g\ddagger YsY^{*}Nh^{\wedge} \quad 0(W?e\ae^{\wedge}-N$

ÿ5

T bXT-N,,v\$N

T/f‡YsY 06q

€

ÿ‡YsY(W?eLu-N 8^*Nh^`

N* * *p_N/f>f

€ f*%o,,v 0

(c)

1 3 4 . *[\u017dN\u2093YsY*S R^—?e\u00e6^*~*~

ÿ*1 g*NUO*1<P-6R 0

N*

ÿlQqQÆT?e*lu;m*N6q ^*l1u7uP[;N*[0FO/f

ÿ*]*Q*s†N‡YsY n* Nek*S

NIQqQÆT?e*!L€*€,v< *R 0

T*e

ÿ(W@b g?eZQ,,v†~*[B* *S*N*S*s‡YsY,,v*Žq_ 0 R/efe*X{vL€*]OS O,,v;N-
^/f N
T‡YsY 0

,{8 ag(*S

N?eœ^ŒT*VE-~*~)

1 3 5 . R/efe*X{v*1 g*NUO*!ĸ_œ-

x*Y x (ulQ*~,v* ag*%š[0 R/efe*X{v,,v*s*N Y*N'Y* /f N

T‡YsY 0‡e S 0R—t^ŒTSO*€* •*N*S*^Q{ŒT*N * *_N1u‡YsY†~*[0

T7h

ÿ R/efe*X{v8^{šT€ T*V,,v*Nh^_N/f N
 T‡YsY 0 R/efe*X{v{š'k2m%o[hQ

N T\O*~*~*Nh^*V,,v*V •_N/f N
T‡YsY 0

,{9 ag(*VM|)
1 3 6 . 1 9 9 6 t^

ÿ*Oš[†NsQŽN*f—_ *VM|ĈET'N1Y*VM|,,v*ł<_

ÿ*N*Ož[*s7usYs^I{ 0*s(W

ÿsQŽN*VM| O*~ Y*VM‘vP(*~* N*kI{..._*eg) ŒTP[sY((W*Qu*e)

ÿ7usY*b g

T7h,,vCg)R 0

1 3 7 . 1uŽN*[*z*l,,v* *y*O*ç

$\ddot{y} \text{ R/efe}^*X\{v^*d^*V \dagger N(Wyb^*Q \text{ } 0^{\wedge}md-[\ddagger YsY \text{ } N \text{ } Rb_ _gk^* \% lQ^* \sim$
 $0^*e@b^*c^*Q,,v^*OYu \text{ } 0$

$,\{1 \text{ } 0 \text{ } ag(\text{ } Ye^* \epsilon)$

$(\text{ } a \text{ })$

$1 \text{ } 3 \text{ } 8 \text{ } . \text{ } \text{ } * \text{ } ^*eb\text{---}7usYs^{\wedge}I\{ \text{ } 0$

$(\text{ } b \text{ })$

$1 \text{ } 3 \text{ } 9 \text{ } . \text{ } \text{ } * \text{ } ^*eb\text{---}7usYs^{\wedge}I\{ \text{ } 0$

$(\text{ } c \text{ })$

$1 \text{ } 4 \text{ } 0 \text{ } . \text{ } \text{ } 7usY$

T!h,,vŸS R* 1 9 6 8 t^*Neg1*](W R/efe*X{vnx*z 0 g

T N@b7usY R*yYe*€,v-Nf[((N@bsYP[-Nf[

ÿ*]ŽN1 9 9 3 t^9e:N7usY T!h 0*S Y

ÿ?eœ^* ŽN1 9 9 4 t^*^*z†N*O* sYi[-
 uĈT‡YsY(W R/efe*X{vs^I{Ye*€:g O,,v*YXT O 0

(d)
 1 4 1 . * *eb—7usYs^I{ 0

(e)
 1 4 2 . * *eb—7usYs^I{ 0

(f)
 1 4 3 . (W*W@xf[!hYe*€-N

ÿ7usYuKN*•*QNN*l g*NUO*]+R 0FO/f(WYe*€,,v

T6-*k

ÿ7usYKN*•*Q*s*)* 0*S RL€ Nf[`N*◁

zÆT N'Yf[„v7uu YŽNsYu 0*Vdk

ÿ‡YsY,,vL€ N f*V*k7uP[*r,,z 0 * *V*[L€ N*T*ċžRlQ*[*c>O,,vwQ

g^”*['`,vD TMe*S*€(W gP–,,v

z*^ N*‰*Q* *y*r*Q 07usY>y O R*]*‰*_,,vhQb—9e*S_N/f

$$T7h^{*'}\%_{o,,v}\ 0$$

$$(\ g\)$$

$$1\ 4\ 4\ .\ (W^{*}\ *eb\text{---}$$

$\ddot{y}_N$

T7h*1 g*NUO*k_œ- x 07usYu(Wf[!h*S0R

$$T_{7h,v} \ddot{Y}^* R = 0$$

$$N^*$$

ÿ7uunfM *ksYu*f R*y g*S RSO*€;m*R

ÿ*V:N*N*N*S*N*S R*f R ^*l,,vSO*€;m*RÆT*b g*f R ^*l,,vSO*€*^*e 0FO/f

ÿ9e*S* *y*r*Q,,v!P*˂

N*€1u*V*[*c*Q 0

(h)

1 4 5 .

V[:g,,g 0aNG•€T*y%,,*~*~* (W* N†~*W*y g _U\;m*R 0*S*N*˂:

N

ÿ*c>O,,v*T*◁

g*R/f*N*N*N n a,,v 0

,{1 1 ag(*]\O:W@b 0u?Q*€sYÆT>y O*Oœ—)

,{1 (a) >k

1 4 6 . ?eœ^,,v*v h/f*%o*Q1Y N

ÿvb c1Y N €ÆT * *V*[%o['c*]\OÆT* *OYe*€
 g*R:N*[~b*e,,v*]\O*c>OOS*R 0

,{1 (b) >k
 1 4 7 . 9hnc1 9 9 3 t^,,v 0*R*] T

T^*l

$0, \{9 \text{ (a) ag}$

ÿ%N y*N'`+R:N1už[L^gk*%o

ÿyr+R/fsQŽNOS*Ꞑ b*‘*S,,vL^*R

ÿ*N*S(Wnx*z*-cOsQ*|-NÆTL€ NKfGS 0*S*Q c;y b*%*-I{*eb— 0

1 4 8 . FO/f(W1\ N†~*W

ÿž[E– N7usYKN*•X[(W@w*]'Y*]+R 0(W*N(N*~Nm;m*R,,v8^OO*N*S-N

ÿ7uP[`S6 2 ÿ

ÿ‡YsY`S3 8    ÿ 0vQ-N2 3    ÿ,,v7uP[`SE\f *š,,vL€MO

ÿ

€* *y*`\*Q,,v‡YsY\*N`S4 ÿ 0

1 4 9 . (W*N‡YsY b7uP[`S*~'Y Ype,,v* *•-N

ÿ

f>fX[(W@w*]'Y*]+R 01 9 9 4 t^

ÿ4 8 . 2 % „v7uP[(W*N N* *.*]\O

ÿFO

T7h*`\*Q,,v‡YsY\*N`S2 6 . 5 ÿ 0*v*kKN

N

ÿ7 2 . 7 ÿ,,v‡YsY(W

g*R* *•1\ N

ÿ

€* *y*`\*Q,,v7uP[ R`S4 8 . 8 % 0 R/efe*X{vxQ<W,,v‡YsY* *•/f*~*~*T6
R 08 f 0*e†™⊕Tn™*~ N 0*”L^⊕ET*‘ ‡ N 0Ye*€ 0kSu*OeP⊕ET*[*^
g*R 0

,{1 (c) >k
1 5 0 . R/efe*X{v,,v 0*R*] T

$$T^*l$$

$$0\&\{ \ T^* \ y^{\sim} \ \%Bl \ 0$$

$$N^* \ (W\check{z}[E--N$$

ÿ(WL€ NYe*€ET* Nek*W*ç*eb—

ÿ‡YsY>f6q=,,

TŽN7uP[0* *y*`\*Q(Wf[`N N*•Kbz,,,v6—*k1*]*~ _*Y*Q*s 0}†6qf[’_*]-
N,,vsYR—

t^*k<O*]*N1 9 7 0 t^,,v1 4 . 8 ÿ NGS0R1 9 9 4 t^,,v3 5 . 6 ÿ

γFOsS O* 7h

$\ddot{y}_N N 6q N^* N / feu$
 $Y\check{Z}N$
 N
 RKN
 N
 0

$,\{1$
 $($
 d
 $)$
 $>k$

1
 5
 1
 $.$
 1
 9
 9
 3
 $t^{\wedge},_v$
 $0^*R^*]$
 T

T*1

0*%ŏš[

$$\ddot{y}(W^*-cOsQ^*|-N$$

ÿ*~XT*],,v*]D

N—_*V:N7usY'`+R

€*šNO g+R 0*[gsQ,,vag<O 0 c:yÆT*Q R\O†N*v”^,,v*O*< 0

1 5 2 . FO/f

ÿž[E-`*Q/f‡YsY,,v6eeQ \ŹN7uP[09hnc1 9 8 7 t^ Ą*g,,v*~œg

$\ddot{y}(W^*]D_{\text{„v}} N^*N R Rch!k-N$

ÿ gNO6eeQ{|7uP[`S1 7 ÿ

ÿ‡YsY`S5 0 ÿ 0*v*kKN

N

ÿ(W g*š6eeQ{|-N

ÿ7uP[`S2 2 ÿ

ÿ‡YsY`S3 ÿ 0

,{1 (e) >k
 1 5 3 . R/efe*X{v>y O*Oœ−6R*^,,v*^*ζ*]*~*W,gℰ[b 0*S Y

$$\ddot{y}(W^* \cdot S_{,,v} \cdot N \triangleright Nt^{\wedge*})'$$

$$\ddot{y}^*]^*\sim \text{ } O>y \text{ } O^*z^*l^* \text{ } 0R_s^{\wedge}I\{\ddot{Y}S \text{ } R_{,,v} \text{ } \%oBl$$

ÿ@b*N*]*~

N Q g*NUOgk*%`„v*%š[01 9 9 6 t^

ÿ g

T,,vek*š/f*O*◊†N 0 €,,ŸŒTW ^\{Qd`**[*l

0

ÿvQ*v,,vKN N/f*[7usY*%š[N*N*~ N,,v†~*S{Qd`*'t^,,Ÿ 0

,{1 (f) >k
1 5 4 . *%sQŽN,{1 1 ag,{2 (a) >k,,v*ĸ* 0

,{2 (a) >k
1 5 5 . R/efe*X{v,,v*z*l&{ T* ›N %Bl 09hnc 0nf l*l
0(*N*N*R*R T

T)

$$\ddot{y}(W\ddagger YsY \quad \backslash U[g^*\bullet \P T^*N$$

T1 6 hT...Qž[L^*%X€*^ R:N/f

N T*eœ[,v*%X€

ÿ*Vdk/f

NAQ*ζ,v 0*V:N*N*N,,v*g*Nyr _

€ž[L^*%*_N/f Ny~* *lL^:N 0*[* N*p,,v t*%”^S_* S*bZZ*Y*r*Q 0

,{2 (b) >k

1 5 6 . 9hnc1 9 9 5 t^*O*◁,,v 0eP*^*Oi-*l

0,,v*%š[

$$\ddot{y}(W L \epsilon \mp Y_s Y_u * \epsilon * S * f_{-2} \quad 0 \quad h T, v e^4$$

$$\ddot{y}_v Q-N^* \quad \backslash 1 \quad 6 \quad h T^*_{\sim}(W^* N$$

T 0,Yæg*]*S ReP*^*Oi-*< R* \2 7 0)Y

$$\ddot{y}_{S-N^*l} \ g^{**}e... \ * \ N^*N \ g$$

ÿ* HN@b—_0R,,ve^4 * \”^*vS_ŽN,g*N* *k*e*•/}*<6eeQ,,v8 0 ÿ 0
 1 5 7 . *l gD <h*N*_ {~*S R,,veP*^*Oi-*< R†~*SeP*^*Oi–
 e^4 ,,v*N‡Y

$$\ddot{y}^*S^*f_{-1}u^*V^*[nf \quad D \quad n/e^*N_{,,v} \ N \ \{ \ N!k'`MQ$$

$$z\ast N\mp Y\%m4\quad 0$$

$$\begin{array}{l} ,\{2\ (\ c\)\ >k\\ 1\ 5\ 8\ .\ \ \ast\ \rangle Nt^{\wedge}eg\end{array}$$

ÿ R/efe*X{v _žR†N*f Y,,v*[*^*N Y,,v*eXb@b 01uŽN*y*N*R>R,,v*~æg

ÿ*s(W

g N*NXb?Q@b:g,,g 0 N*NXb?Q@b*N*~ÆT*c*R:g,,g 0*ç Y|^?Q*VÆT*e
Xb-N*_ 0*V*[9hnc1 9 7 9 t^,,v 0R—t^*l
0/e c* ›N*ç*e 0

,{2 (d) >k
1 5 9 . 01\ N*l
0,{3 3 ag %oBl*–;N S_*l asYL€*],,veP*^

ÿ* *%š[

ÿ:N†N*O*bsYL€*],,vu}TETeP*^

ÿ R>msYL€*]*N<N*g>N{[+R,,v*]\O/f*S0Rag<O ybk,,v

ÿ b*_{~&{ T N>Nyr+R*%š[0

1 6 0 .

`U[‡YsY(W*)\O:W@b*S0Ryr+R*O*b 01 9 6 8 t^,,v 0*]FU N1\ N*

l

0ž[*e*~ R*%š[

ÿ

N—_ RM‘ `U[‡YsYŒET*TsN*k*N*NŸN*~Œšh^

f*[vQeP*^ 0ŠY Z b*TsN g

N)Rq_*T,,v*]\O 0* — %o9hnc*ĸBlMQd–

`U[‡YsYĈET*TsN*k*N*NĸN*[yY*Neg*ĸ*YA~*‘,,v*]\O 0*vMR*ĸ Ock(W8h*Q*[
0*R*R*l

0,,v Ny~*Ock

ÿ* y~*Ock * Nek9e,,U*[`U[ÆT*TsN‡YsY*~^N,,v*O*b 0

,{1 2 ag(kSu*OeP)

,{1 >k

1 6 1 . 9hnc1 9 7 1 t^,,v 0eP*^*Oi-~l

0,{2 4 ag

$$\ddot{y}^*V^*[*kt^{\wedge}* \quad R^*b^*_{\sim\{^*S\,R,,v^*O i-\mathfrak{E}T,,\tilde{2}-;S\text{---}}\\u^*c^*e,,v_9\ (u\ 0\ R^*b,,v^*k\lhd O^*S_9h nct^{\wedge},,\ddot{Y}\mathfrak{E}T'\text{`}+R$$

$\epsilon^* S \quad S$

ÿ*Vdk

N O b*]+R..._G 0

1 6 2 . (WeP*^*Oi-†~*W

ÿ*V*[R*b,,v* Rnx*O7usY/e*N

T7h,v*Oi- *‘ 0

,{2 >k

1 6 3 . *%sQŽN,{4 agŒT,{1 1 ag,,v*ĸ* 0

,{1 3 ag(*~NmŒT>y Ou;m,,vvQ*N†~*W)

(a)

1 6 4 . 9hnc1 9 8 5 t^,,v 0*[*^%m4 *l

0,{3 5 ag,{1 >k

ÿ,Yœg gD <h†~*S%m4 €... * N*N

ÿ R% m4 /e*N*~?Q*z,,v*[*^7b;N 0*~1 9 9 5 t^*O*◄,,v,{2 >k*%š[

ÿ*[ŽN*]ZZ6r*kT€ T*[*^N,,v?Q*z

$\ddot{y} \quad 8^{\wedge*}]$

N Q/f1u N+Y

€/f1ui[P[,v;N %ogqTMe €*b gD <h†~*S*[*^%m4 0

(b)

1 6 5 . (W*f—

*”L^7 >k 0*b*b7 >kⒼTvQ*Nb _,,v" ?e*O7 ,,vCg)R*eb—

ÿ R/efe*X{v,,v*z*l*l ggk*%o‡YsY,,vag>k 0

1 6 6 . 6q

€

ÿ1uŽN7usY" *N*r*Q,,v

N

ÿ_N,,vnxX[(W@w*]+R 0FO/f

ÿž[E-`*Q,YUO

ÿ*e*~*⌢peW[0

(c)

1 6 7 . sQŽN*S R1ZPN;m*R 0SO*€;m*RCET T*eb—‡e S-
u;m,,vCg)R

ÿ R/efe*X{v,,v*z*l-N*l ggk*%o‡YsY,,v*%oš[0
 1 6 8 . 6q

€

ÿ7uP[>f6q*k‡YsY*f R ^*l0W*S R1ZPN;m*R 0ÿS*V*e‘u/f

N*~,g N,,v b1u>y O R*]*Qš[,v*%or,sQ*|*vsQ 0

,{1 4 ag(æQQg0W:S‡YsY,,vs^I{)

,{1 >k

1 6 9 . (W R/efe*X{v

ÿæQ N*Sw ... *R\O(u 0*S

g3 ÿ,,v7u'`ÆT0 . 8 ÿ,,vsY'`*N*S*N<NæQ N 0—g NÆT*Vz, 0

1 7 0 . 1\ R/efe*X{v

€ Š

ÿæQQg0W:SÇET*W ^0W:S/f*-*N:S R,,v

ÿ*V:N R/efe*X{v;`SO N/f+RwQ N<h,,v0u*V*~IQ

ÿFO*N*~Nm*%*^eg

w

$\ddot{y} \text{ } R/f \text{ } N^*N^*s^*N \text{ } S_{,,v^*}] \text{ } N\mathbb{E}T$

$g^*RL^{\wedge} \text{ } N^*V^*[\text{ } 0$

$,\{2 \text{ } (\text{ } a \text{ }) \text{ } >k$

$1 \text{ } 7 \text{ } 1 \text{ } . \text{ } (W^* \text{ } N\dag^{\sim}W^*]g^*[\ddag YsY_{,,vgk^*}\%o \text{ } 0$

$,\{2 \text{ } (\text{ } b \text{ }) \text{ } >k$

$1 \text{ } 7 \text{ } 2 \text{ } . \text{ } (W^* \text{ } N\dag^{\sim}W^*]g^*[\ddag YsY_{,,vgk^*}\%o \text{ } 0$

$,\{2 \text{ } (\text{ } c \text{ }) \text{ } >k$

$1 \text{ } 7 \text{ } 3 \text{ } . \text{ } (W^* \text{ } N\dag^{\sim}W^*]g^*[\ddag YsY_{,,vgk^*}\%o \text{ } 0$

$,\{2 \text{ } (\text{ } d \text{ }) \text{ } >k$

$1 \text{ } 7 \text{ } 4 \text{ } . \text{ } (W^* \text{ } N\dag^{\sim}W^*]g^*[\ddag YsY_{,,vgk^*}\%o \text{ } 0$

$,\{2 \text{ } (\text{ } e \text{ }) \text{ } >k$

$1 \text{ } 7 \text{ } 5 \text{ } . \text{ } (W^* \text{ } N\dag^{\sim}W^*]g^*[\ddag YsY_{,,vgk^*}\%o \text{ } 0$

$,\{2 \text{ } (\text{ } f \text{ }) \text{ } >k$

$1 \text{ } 7 \text{ } 6 \text{ } . \text{ } (W^* \text{ } N\dag^{\sim}W^*]g^*[\ddag YsY_{,,vgk^*}\%o \text{ } 0$

$,\{2 \text{ } (\text{ } g \text{ }) \text{ } >k$

$1 \text{ } 7 \text{ } 7 \text{ } . \text{ } (W^* \text{ } N\dag^{\sim}W^*]$

$g^*[\ddag YsY_{,,vgk^*}\%o \text{ } 0^*S^*\%oS\check{Z}N,\{1 \text{ } 3 \text{ } (\text{ } b \text{ }) \text{ } ag_{,,v^*}\text{ } ^{\text{ } } \text{ } 0$

,{2 (h) >k

1 7 8 . (W* N†~*W*lg*[‡YsY,,vgk*‰ 0

,{1 5 ag(*l<_b—MRs^I{)

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