ä½ å¥½ï¼Œæ^'æ^'朱c»/å^šã€.欢è;Žä½ è-Ÿæ^'ä €èu é†ålc°;æ€\$代æ•°ï¼

今å□©æ°°ä»~æ¥èŠä €èŠá€œ¢°¿æ€Şç©°é—′á€ã€¸åœ°ã€œ<u>å°°¤œ∞~æ′¸å¿i</u>á€é¸£ã €èЏê¯¼ä¸f¼Œæ°°è®³å°ä°†å°é∮f¼Œæ°½ ä°Ÿçœå°°ä°†f¼Œ¢°;æ€Şæ−'ç°⟨∞,æ°¯e∱¼å□Ÿé€šè;¸†çŸ©€° µæ′−

睴á°°¢¿æ€\$ç©'ó—Ť1⁄Æā…¶ã®Zā½ å¯ä»¥é€šċ¿ţā6œç©'ó—´á6这丰ē®Š\$¢;æ€\$ç©'ó—´á`Œæ``ä»Ҿ\$;Ÿkœ`»åšä¸°ç±»æ``〸å°±å∫æ*`ä»Ҿ°Ÿæ′»åœ¨ä¸җ∞'ã¬ç•Œä¸1¼Œāœ°è;™ä¸°ç©'ó—´á j¹¼Œāçë¸ţ物ò ``óƒ½∞¯è;å\$``ç\$,j¼Œè€Œè;å\$``ä'Ÿæ¯æœ‰ã¸€ã®\$è§,弫ç\$,ã€,è;™ä¹°æ¥çœç\$,ȯ1¼Æç©'ó—´å…¶ã®Zå°±æ¯ã,€ä¸ªå…有å®zĕ™…æ,ä'‰ç\$,¢›†å°1¼Œå…¶ä¸åŒ…å«ä°†å¯°è±;å'Œè;å\$`¨ä€,

把ċį™ä"ç†è\$£å¹°ç%尰簿性ç©'间也æ¯ã,Eæ∵ç\$,j¼Œå¹ėţå°±æ¯å¯ìè±jt¼Œå¦,æžææŠŠå'éţçœæ°æ¯**簿性**ç©'é—´ã,**çš,ç,¹t**¼Œć,£å'éţç**š,,å***æġå°±æ¯ç,¹åæ°ç©'é—´ã,çš,è¿åЍä€,所ä¾¥/Æ¢;≀性ç©'é— `a'Yæ¯ā tā "ódān'ct™ā; vætsove — "a'ya'\a'`tæ vås'n'Atā'awww.cZtæ; a"do"tæ'\ae\sove — "i'Atæ' ab — "wetsove a'\ae\sove a

c»,,ï¹/4^c³/4¤ï¹/4%0

 $\grave{e}_{i}\tilde{a}^{-}\grave{e}\mathfrak{E}\hat{a}\cdot\mathring{a}i^{\prime}4\hat{E}\hat{a}^{\cdot}\mathring{a})-\grave{e}_{i}^{\dagger}\mathring{a}...\hat{a})\mathring{Z}\mathring{a}|\ddot{a}|\ \varsigma^{o}_{i}\hat{a}\mathfrak{E}\S\varsigma\mathbb{C}^{o}\acute{e}-\mathring{a}^{\prime}4\mathring{s}\varsigma^{\prime}\mathring{a}^{\circ}\varsigma\mathring{s},\mathring{a}\mathring{Y}^{\circ}\varsigma_{i}\mathfrak{E}\varsigma\ddot{Y}\grave{e}^{-}\dagger\mathring{a}^{\prime}4\mathfrak{E}\mathring{a}\S\varsigma\grave{e}^{\otimes}\mathring{e}^$

ê´a°tè¿\™a''ā°Sī¼Œā¢œç», â¢ã°°â°æ´ā»¢ā''ā'çī¼Ýç», ‡¼Œã..¶ã®žã°±æ¯ãŒ...å«ã Çç`»å´—å...fç´ç\$,&†ā T¼Œãœ´ā¯'è¿™ã°ò†å°ā...fç´å®žæ~½æÝç±»è¿ç®—åŽi¼Œè¿™ã¸°ò†á°ā»ç,¶ã;æŒç€ã°é—性ã€,ā¯òf½è¿™ã'°è¯'ā½ ã¼šœœ‰ã°°ç-'æf'1¼Œæˆ°è¿¯æ¯é€\$è;‡æ°°å;æ—'æ³*æ¥å®šã′‰ç»,‡¼Œã¯òf½ä¼šò®©ã½ ç\$,æ€è¯æ′åŠ æ,..æ™°ã €ã°å€,

æ`*a>-å...`æ¥å®\$ā'%ā €ā,*ó†å`\$G\$å`Œé;†å`ä Šç\$,æŸä €ç±>è;ç®—if/Œæ``ä|,if/\$ā'`\$\otimes\$if/Œā/;å?/←\$G\otimes G\$ ç\$,ç>;*æ*æè;`æ``å±28°Ž\$G\$i/Æā/,æ*ææ* 'ā>-è;\$G=(G,

2. e./mil y / a d. mies z – Normal i a ± e. Description y, y a mody volume y normal y sums y some sex e volumes e=x, e volumes x=x\$1/4Ge\(\)_t^m\(\)_t^t E\(\)_t^s,\(\)_t^s\(

 $4. \; acc\% \$x\$ \xi \check{s}, \acute{e} \xi^{\dagger} \mathring{a}... f \varsigma' \; \$y\$ \check{i}' \angle E \check{i}' \check{i}^{\sharp} \check{a}' + i' \acute{a} \$ \hat{i} - i' \acute{a} \xi \hat{i} - i' \acute{a} \xi \hat{i}' -$

å†è;¥å......ä,€ç,¹i½Æå¦,æžœæ»;è¶°\$\forall x, y \in G: x \otimes y=y \otimes x\$1½Æå´™\$G:=(G, \otimes)\$就勿³½œå°□æ¢ç»,ã€,

ä,¢ä,*\$n×n\$ç\$,实œ•°çÝ©¢°µ\$A\$å°Œå®fç\$,ä!°æ³•è¿ç®—æ°¯ä,€ä,°ç»,å—i?4Ÿ¢€\$è¿ţ符å·è;°ë>¼¼å°±æ°¯i½\$\$\\efi(A^{n \times n}, \quad \cdot\right)\$ã€,

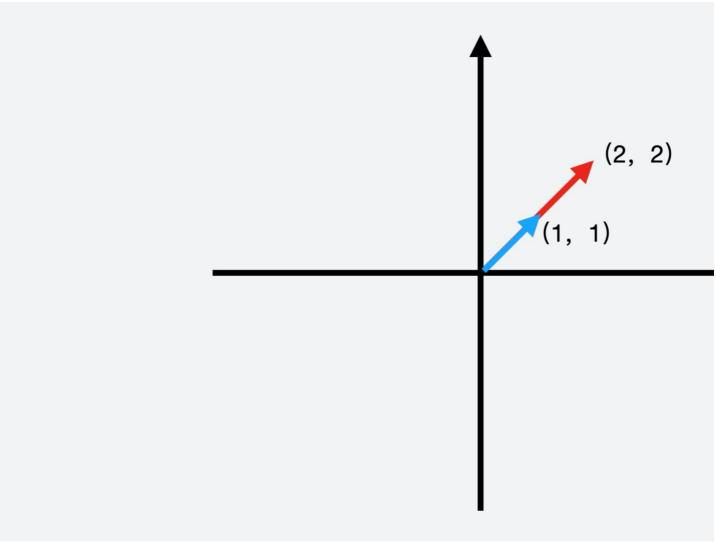
 $\textit{$xf^3e', Ye''e', T^M$a'', e'-\$e', x''a'', a''+E^*a'' = e'' + e''' + e'' + e''$

ä°Žæ¯ī¼Œæ^;ä»=ā 以睴\$\left(A^{n \times n}, \quad \cdot\right)\$æ¯ä,€ä,ªç»,,#¼Œè€ŒçŸ©é°µä°ä,ç~¦å°ä°¤æ¢å¾d¼Œæ‰€ä»¥è¿;™ä,°ç»,å°¶ä,æ¯ä°¤æ¢ç»,ã€,

å'釢©°é—

ål,æžæz"ä»-地ā6œx,åfcs,埰c;fäŠå†æ‰Cå±*ä fä d¼Eå°±èf½å¤Ÿå¼´é;°å°C地æ¥å°°å6œœ';æ€\$c©°é—′å€ã€,è¯′èurc°;æ€\$c©°é—′1¼Eå®fä'Ÿå«ä½œå'é‡c©°é— "I/AŒÂ®ĴÃŒ`ā €B°\8I¦æŒ¯Å'ŒÇ\/; ¢›œŒŠÇ\$,&\$£Ŀ¢‡Šeʃ'/æ¯`æ`'ĕ}/ſæ™\æ"¶©ĖS!⁄æ£;,Ç\$,I/ÆB!/\$†å],æžœæ' "ð>¬åœ"〜¢»,å€ç\$,埰ç;€B,Šæ¥e\$£¢}Šå®∫t!⁄AŒB!/\$å‴°ē¯¥B!/≾æ¯`'ĕ}/ſå®'æ`'¢†è\$£B°†\$€.

 $\hat{a}^*\hat{s} \otimes \mathcal{W} \hat{a}^*\hat{e}^*\hat{s} = \hat{b}^*\hat{s} = \hat{b}$



ä¢ä"åBžæ°å'¢jç©°ć—SV\$æ¯ä¢ä,°év†åT%EàBf包å«å°†ä,¤ç±»è;ç®—t%Eä,¢ç±»æ¯åŠT%Eä,¢ç±»æ¯æ ţ¢ţä°T%E而ä,°è;ç®—éf%æ»;è¶°SV\$çš,å°ć—性T%Eä\Ÿå°±æ¯è¯T%E\$V\$ä,å…fç′çš,è;ç®—ç%°æžœè;"æ¯å±žä°Ž\$V\$ä€,

 $\grave{e}_{\dot{c}}{}^{TM}\ddot{a}_{,}{}^{a}\mathring{a}`\acute{e}_{,}^{\dagger}\varsigma\mathbb{C}^{0}\acute{e}-\acute{a}\bar{a}_{,}{}^{2}\mathring{a}+\grave{e}_{,}{}^{\circ}\varsigma\mathbb{C}^{0}\\ &\mathbb{C}^{1}(V,+,\cdot)\hat{s}_{,}{}^{2}(V,+,\cdot)\hat{s}_{$

1.å'é‡ç©°é—´\$V\$çš,\$(V,+)\$æ¯ä,€ä,ªä°¤æ¢ç»,ã€,

 $4. V \mathring{a} = -\acute{e}f \mathring{e}_{\mathring{c}} \mathring{c}_{\mathbb{C}} @ - \mathring{c}s, \cancel{x} \mathring{c} / \mathring{w} \mathring{a} \dots f \mathring{c} / \cancel{x}) \mathring{e} \mathring{f} \mathring{a} / \mathring{a} \mathring{s} \mathring{s} \text{ for all } x \in V: 1 \cdot (1 \cdot x - x) \mathring{a} ... \mathring{e}_{\mathbb{C}} \mathring$

å¥/;a"+f1/4Œæ"∙ç»,™å‡′;a"+å°éţçç°6—´ç\$,ä,€6`~œ∂;°å′Œœ•°å¦ä®\$ä′%nf/Œå¦,æžœä/₂6;″æ"œœ‰ã,€ä°)ä,ç†è\$£f1/4Œā′Ÿæ²;æœ‱å...³ç³»#/Œæ°å†ä¸¼ä;¤ä,"ä†ü,åä₽ä,"ä†ü,åöç°6—′ç\$,ç†è\$£ā€,

ä¾<1:è;>ä,€æ¥ç†è§£å'é‡åŠ å'Œæ ‡é‡ä¹~

 $a^{-1}a^{o}Za^{'} + c_{i}^{2} + c_{i}^{$

- æ ‡é‡äl*å°±æ*-å'é‡äl*æ ‡é‡ïl%\$\lambda x=\lambda\lefi(x_{1}, \ldots, x_{n}\right)=\lefi(\lambda x_{1}, \ldots, \lambda x_{n}\right)\SãC, æ ‡é‡äl*ç\$, ρ \'æžæè $_{1}$ 'æ*-å'±žä'Žå'é‡ $_{2}$ C"é—'\$R^{n}\$ãC,

ä¾⟨2:è¿⟩一æ¥ç†è§£çŸ©é~µåŠ å'Œæ ‡é‡ä¹~

\$\$ A+B=\left[\begin{array} {ccc} a_{11}+b_{11} & \ldots & a_{1}+b_{11} \ \\ \cdot & & \cdot \\ \cdot & & \cdot \\\ \cdot & & \cdot \\\ a_{11}+b_{m1} & \cdot & a_{m1}+b_{mn} \ \cdot & a_{m1}+b_{m1} & \cdot & a_{mn}+b_{mn} \ \cdot & \cdot \\\ \cdot & \cdot & \cdot \\\ \cdot & \cdot & \cdot \\\ \cdot & \cdot & \cdot & \cdot \\\ \cdot & \cdot

 $\grave{e}CEx \ddagger \acute{e}\ddagger \ddot{a}\hat{a}\hat{b} \pm x - \ddot{a}\hat{b} + \ddot{a}\hat{b} +$

 $\label{lem:lemond} $$ \Lambda=\left(\frac{1n}{\infty} \right) \ A = \left(1n \right) \ A$

å^°è;/™¢‡Œj'.Æç›,ä;;jä'.⁄;å^°`è`¥ä'†è\$£ã'†å'¢‡ç©'ó—´çš,å`Ý''œœ'æ¦,å;jii'.ÆæŽ¥ä,«æ¥è;/™ä_€è®ç\$,é‡åc'æ'å°±è@¥ä'†i'.Æå®∫å°±æ'¯å'é‡åç©'ó—´ã€,

å'é‡åç©°é—

ä,°ä»€ä'`è¯'å'éţåç©'é—'æ¯'eţå¤'æTi⁄Ÿé,£æ¯å; ä,°å®fåœ'æœ'å™ä¦ä' ä,ç\$,åo@'a'/ç¢,å\z''éţèţī/Æè¢‹«;`"åœ'ä'¥f\rm,v°¢®—æ*•ä,ã€,è¿™¢ţŒæ`'äl/ášå`†ä,¤æ¥æ¥è®²è\$£ī/Æã...`讳å'éţåç©'é—
'çx,埰æœ-æ¦,念ï/Æå†¢€\$è¿ţä,Ęä,°æœ'ã™'ä|ä',çx,ä/«åï/Æè//Æè%©ä½ æ';ä°†è\$£å®fï/Æä!¶çµæ'»è¿ç'"åœ'ä.¥ä/∞实ċ-µä,ã€,

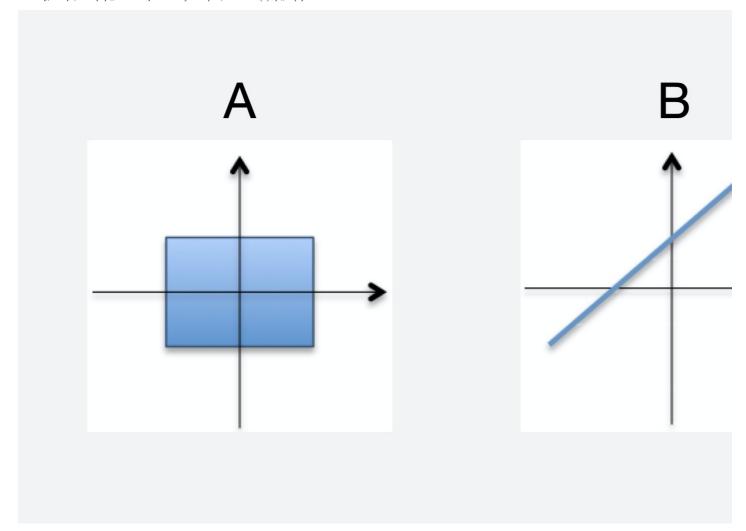
什ä¹^æ~a'é±åc©ºé—ï¹/4Ÿ

äbŽáCœåâCċ;TMä¸å—1¼Œæ´täb;Tå¯äb¥å¾çp´è޸地æf³å°Y¼Œå®fæ¯e¢«åŒ…å«åœ°ä'eʻţç©°é—'ä¸ç\$¸ĭ¼Œä°å®žä¹Ÿç¡®å®žä¹¸æ°ä€¸

1.\$U \neq 0\$,但\$0 \in U\$ã€

2. Uçs,å°é-性æ»;ë¶å¤-郰è;ç®—†⁄ä\$\forall \ambda \in R, \forall x \in U; \ambda x \in U\$\forald Eæ—¶æ»;ë¶å†...郰è;ç®—†⁄ä\$\forall x, y \in U; x+y \in U\$ã€,

äxçx完ã'éţåç©'é—'埰本æ¦å;µåŽī¹⁄Œæˆ'äx¬ä €èµæ¥é€Sè; jä €ä "ä³⁄«åæ¥å ©å»ä €ä «æ‰€ã¦ç\$,知睆1¹⁄Æçœxçœx⽿¯å¦å°²çx掌æjä°†å'éţåç©'é—'ã€,



 $\grave{e}_{\mathcal{C}}^{\mathsf{TM}} \acute{e}_{\mathcal{C}}^{\mathsf{TM}} \acute{e}_{\mathcal{C}}^{\mathsf{TM}} \acute{e}_{\mathcal{C}}^{\mathsf{TM}} \acute{a}_{\mathcal{C}}^{\mathsf{TM}} \acute{e}_{\mathcal{C}}^{\mathsf{TM}} \acute{a}_{\mathcal{C}}^{\mathsf{TM}} \acute{e}_{\mathcal{C}}^{\mathsf{TM}} \acute{e}$

机å™"å|ä¹ ä¸çš,,å'é‡å空é—′

ç››''â'âBZè:pæ¥çœd'éţåç©'ó—'çs¸æ—¶āE™â'°ã'tãE¸âœ'œœ'å™'āla' ā jt/Æç›'œŽ¥èBjçB—é«`ç›/œ°®Bå›°és%éţċţt/Æā;€æ-'¢¢æ'`æ•°œBâ¤,ç†å'Œâ'†æžà°és%dt/Æā½å/4—æ•°œBā`视åŒ-åţ ā'Žā¸ā `e/'⁄at/vå¦ä;€æ-¹¢¢æ'`ā› ā';œ•°œBā`ā,''éţå¤å¤Şt/ÆÈBjçB—è¦ā›°ā‡°çs¸āb£ā›°å¤'é«`ā€,

所以†¼Œæ´ï们ċ¦ïåŽå'ċţŷ¢°ć—´ä¸åŽòċ™□冗ä½™æ°æ®ï¼Œå½æ°å'ċţå碰ć—´ã¢¸è¿™æ æ°æ®ã¸å,∵ċţ就袋æžä□Şåæ°åŽ‹ç¼€ä°†ï¼Œå□¸ç†å`Œå↑†æžæ°æ®ä¹Ÿç®€å•ä°†å¾ å□\$〸å 丑ċ‹ç›'æ°æ®ä¸å... ¶å®Źæœ‰å¾ å□\$ç›'æ¯å†—余皸¼Æå®∫们å¯ä»¥è¢‹å...¶å®∫ç›′ç›,åˆè;"ç⊏″f¼Œä¹Ÿå°±æ¯ã€œċ™ç›;"å6ä€,

€™♥'n´ã°±æ¯ã°©Ç``ç'n`æ≵åŒ−å`Œç¸å…³æ€\$,在ã°½ċţā¿ē¯ā¿jæ¯äæŸã°±ç\$,æf…å†jä¸₫¼Œè½⁻æ¢æ•°æ®èj¯çްä½¢å¼i¼Œè®©æ•°æ®æ›´á€œç´\$凑âēā€,æ¢å¥è¯ē¯ ′,ï½å¯ä»¾æŠŠ€™ç»′çœæ°æ¯æ•°œ®åŽι缩技术,类似å³√ååfçš,jpegå′Œéݰ¢¢°ç\$,MP3åŽι缩算法ã€,æ°−者简å•地∈¯ï¼Œ¢™ç»′å°±æ¯ã°†æ•°œ®æŠ•å°,å°°ã,å°°ã,ëä°å½ç»′åç©°ć— ′,毳ä,jï√sä,‰ç»′数殢∘†å¯ä»¥¢™æ°ã°Œç»′,ä¹Ýã°±æ¯æŠŠæ•°æ®æ°ã°,å°°å¹³¢¢ä¸Šå€,

œœ⁴å™*ájä¹ ä è¿ç°''最䤺çs,¢™ç»′算法å°±æ¯ä »æ°å†å°†æžľ⁄Æç®€ç§°PCAtl⁄₁Principal Component Analysisil/‰il/Æäl'Ÿå«åšåjå°°èfjå®-å‹'夫å`æ¢il/ïKarhunen-Loeve Transformil/‱ã€,å®fæ¯ä¸€çşç'''䰎探ç ′¢é«ç»/œ•°œ®ç»'æz¸çş,æŚ€æœ ïl/Æå°-zvå*地è¶...过100å1′ä°†il/Æäl/†è‡ä»Šä»ç,¶å¹¿æ³›è¢«äl/¿ç"'䜰æ°@æŽ⊄ç/Æå'Œå 视åŒ-ä¸å€,

æ``ā»;*æ¥çœ;ā,£ä,*a¾;dāi½\$%;åi½\$%;åi½\$%;åi½\$%;åi;\$e\forma;*a;a;\$e\forma;*a;a;\$e\forma;*a;a;\$e\forma;*a;a;\$e\forma;*a;a;\$e\forma;*a;\$e\form



å‡å®\$æ¯ä,"æ•°å—æ¯ä €ä,"\$28*28\$å°°å_ç\$,ç°å°¦å½ç%₀†µ¼E包å«784ä,"å∫ç° ¼¼Eé,£æ¯å¼ ç°å°¦æ•°å—廼片å°±æ¯ä €ä,"å'é†å°±æœ‰784ä,"绑å°¼¼Eå¯ä»¥è;¨ç□°æ°\$x \in R^ {784}\$f¼Æè€Œä½ç\$,æ∵术å°°å°°è¯ä¹Ýæœ‱å‡ää,‡ä,"æ∵æœ∞殼Æå;ææœŒ‰ä,€è¯¬ç\$,æ–¹æ³æ¯ä,ã¯e/½åšå°å®žæ— ¶È¯†å°«ṣ,ã€,所以f¼Æè¿™æ∵çṣ,地∞™å°±ċ∞€èä½;ç°"PCAæ¥åŽự缩æ°∞æ®f¼Æè¿›è;Œå¤§å¹…å°∣€™ç»'ã€,

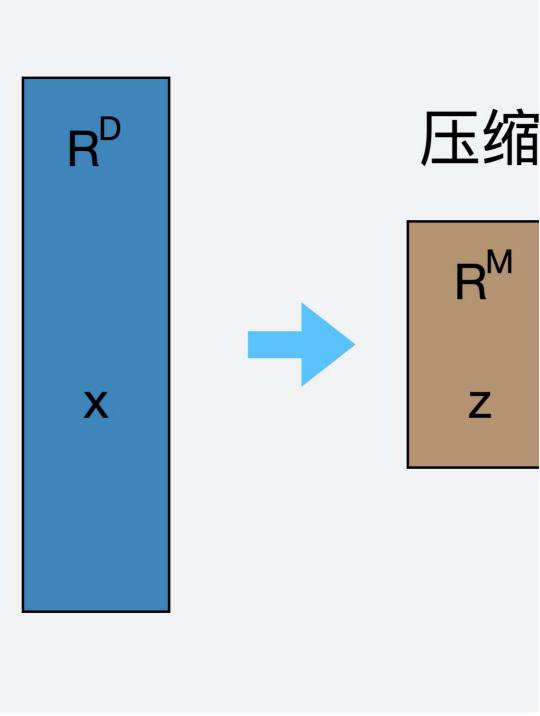
 $\dot{e}_{c}^{TM}\dot{e}_{f}^{TE}\dot{e}^{*}\ddot{a}_{r}^{*}\ddot{a}_{$

\$\$ \\eft[\begin{array} {I} \\ 5 \\\ 3 \\end{array} \right]=5 e_{1}+3 e_{2} \\ \$\$

\$\$
y_{n}=\left[\begin{array} {I}
0 \\\
z
\end{array}\right] \in R^{2}, z \in R
\$\$

 $\label{eq:control_eq} \mbox{$^{$}$} \mbox{$^{}$} \mbox{$^{$}$} \mbox{$^{$}$} \mbox{$^{$}$} \mbox{$^{$}$} \mbox$

 $b_{\ell} \text{TM} \text{\'e}_{\ell} \text{TE}_{\ell} \text{\re}_{k} \text$



åð¼ç\$,å¦è¼'æ¯åŽŸåŞd°¢ţç©'é—'\$X\$T¼Œç»è;ţäŽç¼ÆåŽt¼Ææ*'ä»=扼å*°ä†åå'¢ţç©'é—'\$Z\$T¼Œ\$Z\$ç»è;ţéţæz,åŽt¼Æå½¢æ*ä*†æœ€ç»°ç\$,å'éţç©'é—'\$Y\$T¼Œ\$Y\$è;¯æ¯å±ZaŽŽæ¥ç\$,å'éţç©'é—'T¼Œä½†\$Y\$å'楜œ‰æ¯`\$X\$æ» ä½Žç\$,ç»'å"è;¯çŽ*ã€,

ävŽæv°ä¦çš,è\$`å"¦çœdī¼Œæ`'ä»r其䮞ä°±æ¯åœ¨ä¯xœ‰i%\$x\$å`Œ\$zåï⟨ć—′çs,簦性å…³ç°x,ä½i...¶ä*y=Sz=B^{T}x\$ī¼Œä»¥å\$\$y=Bz\$ī¼Œå...¶ä,\$B\$æ¯çŸ©¢`µä€,å¦,æžææ°ä»¯ävŽæv°æ®åŽç缩技术æ−¹å`æ¥çœå°±æ∵å®'毰ç½¢±æ¯æ¯å°,‡¼ŒêŒçŸ©¢"µBå°±æ¯æŠŠå±žä°Ž\$R^{M}\$å°¢ţç©'é— ′çs,ā¦∕Žçn′çs,\$z\$ī¼Œæ¯å°,åxžžŽœ¥çs,å°¢ţç©'é—′\$R^{D}\$ä€,åŒç†ï¼ŒçŸ©¢`µ\$B^{T}\$å°±æ¯æŠŠå±žã°ŽãŽŸæ¥\$R^{D}\$å°¢ţç©'é—′çs,év°çn′\$x\$åŽç;¼©æ°ã½Ç;√x\$ã€;

本èŠ,å°c»"

 $as \& C_{S_{1}} = as \&$

冿¬¡ç‰¦å′«œ¢†™£èè®'éz帢ṭèjt/«Œà ä,°åŽé¢åţ è®'éƒ'/æ¯å′ç»⁴å'¢ţç©'é—'展å'/Æçš,jt/«Œå¦,æžæä½ å°°¢ţŒæ²¡çœæţ,jt/«Œä,€å®šè¦å¤\$çœåţ 次t/Æç;®ä¿å®Œå...¨æ`Žç™/;ä°†ã€,有ä»»ä/₂•é—®éç°T/Æï½ ä'Ÿå¯ä»¥éšæ—¶åœ°ç•™ë°EåŒ'å'æ´'æé—®ã€,

簿性代æ•°ç»fä¹ åœ°

 $\ddot{a}' \cdot \dot{a}' \cdot \dot{w} = \ddot{a}' \cdot \ddot{w} = \ddot{a}' \dot{w} = \ddot{a}' \dot{w} = \ddot{a}' \dot{w} = \ddot{a}' \dot{w} = \ddot{a}' \ddot{w} =$

¢‡‡æ∵æ¯æ°æææ°¶₀†ç\$¸è;‡çïd¼Œæ•°æææ°¶७†åŽéœ€èjåšæ•°ææé¢,å□¸ç†f¼Œè€Œé¢,å□¸ç†ç\$¸å…³6°™ä,€æ¥å°±æ¯ç‰¦å½æå−i¼Œè޳地è¯ïä½ ä»Žå€œç‰¦å⅓æå−â€ç\$¸æ−¹å¹a¸Šæ€è€fä¸d¼Œæœ‱å°°ä°å°Œçææ‰6°äå°°ç\$¸æ•°å¦çŸ¥è¯†æœ‰å...¾¼Ÿ

 $x = y \hat{c}_i \hat{Z} \hat{a} \hat{w}^*_j \hat{A} \hat{w}^*_j \hat{A} \hat{w}^*_j \hat{a}_i \hat{a}_j \hat{a}_i \hat{a}_j \hat{a}_i \hat{a}_j \hat{a}_i \hat{a$