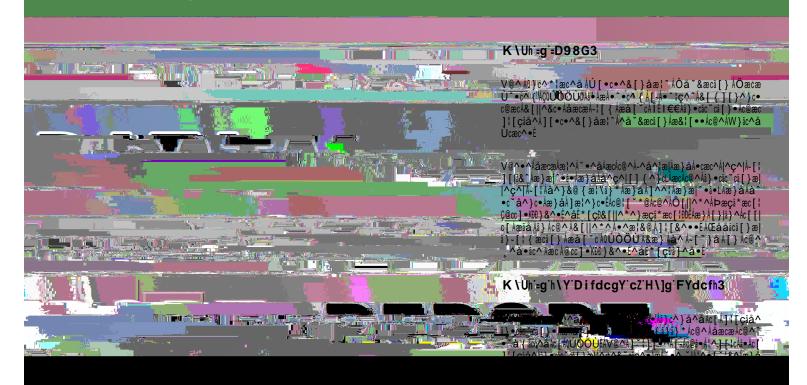
# B5H=CB5@'79BH9F': CF'98 I 75H=CB'GH5H=GH=7G



# 7CAD5F=GCB'; FCID

Ô[{]ælå•[}Å\*![~]ÅæææÁæ!^Áå}&|~å^åÁc[Å]![çåå^ÁæÁ&[}c^¢cÁ-[Hå}c^!]!^cå}\*Á^[~!Åå}\*cåc~åi[}q◆Á\*cææá\*cå&\*ÈÁQÅ^[~!¼å}\*cåc~äi[}ÅåååÅ}[cÅå^å}^ÅæÁ&~\*ec[{&[{]ælå\*[}Å\*![~]Å-[HÅc@å\*Å!^][lcÅå^ÁR~j^AFHÉAG€FJÁÞÔÒÙÁ\*^|^&c^åÁæÁ&[{]ælå\*[}Å\*![~]Å-[HÅc@å\*Å!@å\*Á&@æ!æ&c^lå\*cå&\*Á~å}^c@^Á&[{]ælå\*[]}Á\*![~]Áæ]]^æ!\*Áà^|[,EDÁV@^ÁÔ~\*c[{å\*Aå}A)}\
c@^Á&[{]ælå\*[]Å\*![~]Áæ]]^æ!\*Áà^|[,EDÁV@^ÁÔ~\*c[{å:\*ÁÖæææÁØ^^åàæ&\ÁÜ^][,cA~\*}&c[]}æjå\*Alj}\ Ç@cc]•KbB}&^•Ē^åĒ\*[çBā]^å•Bāæcæ&^}c^iBDÁ&æ}Áà^Á`•^ååc[Á!^]¦[å`&^Ác@^Á-ā\*`!^•Áā}Ác@ā•Á!^][ich`•ā}\*Áaā--^!^}ck]^^!A'![`]•Ē

V@^Á&~•c[{Á&[{]æ¦å•[}Á\*:[~]Á&@[•^}Áà^ÁW}äç^!•ãc^Á[-ÁÙ[~c@^!}ÁQ}ååæ}æÁã}&|~å^•Ác@^Á-[||[\_å}\*ÁF€Áå}•cåc~cå[]•K

- **▶**Ø^¦¦å•ÁÙcæc^ÁW}åç^¦•âc^ÁÇÓå\*ÁÜæ]åå•ÊÁ⊤QD
- $\label{eq:second_second} $$ S^c:c[_, ]_{AW}_{ac^{-1}} \bullet ac^{A}[_{AU^{-1}}] \bullet [_{c@}]_{a@ACS}^c:c[_, ]_{EAUCED} $$$
- $\label{eq:linear_property} \blacktriangleright \ T \hat{a} \ \} \land \bullet \ [ cæ \land \dot{U} cæ c \land AW \ \} \hat{a} c \land \vdash \dot{E} \ T \& \} \ \backslash \&c \ [ \dot{A} \dot{C} \ T \& \} \ \backslash \&c \ [ \dot{E} \dot{A} \ T \ D \ D \ AW \ ]$
- ▶ Þ[¦c@^¦}ÁTä&@ā\*æ}ÁW}āç^¦•āc^ÁÇTæ¦~~^cc^ÊÁTQD
- $\label{eq:linear_property} \blacktriangleright\grave{\mathsf{U}}\&\left\{ \begin{smallmatrix} \mathsf{A}\mathsf{P} \end{smallmatrix}\right[ \check{\phantom{\mathsf{L}}} \circ \mathsf{c} \left[ \begin{smallmatrix} \mathsf{A} \\ \mathsf{L} \end{smallmatrix}\right] \& \mathsf{c} \circ \mathsf{c} & \mathsf{c} \end{smallmatrix}\right\} \& \mathsf{c} \circ \mathsf{c} \circ \mathsf{c} & \mathsf{c} \circ \mathsf{c} & \mathsf{c} \circ \mathsf{c} & \mathsf{c} \circ \mathsf{c} & \mathsf{c} \end{array}$
- $\label{eq:continuous} \begin{tabular}{ll} $\bullet$ \dot{U}[a] ] ^{!} \dot{U}[a] ] \\ \begin{tabular}{ll} $\bullet$ \dot{U}[a] ] ^{!} \dot{U}[a] ] ^{!} \dot{U}[a] ] \\ \begin{tabular}{ll} $\bullet$ \dot{U}[a] \\ \begin{tabular}{ll} $\bullet$ \dot{U}[a]$
- ▶ Û [ ~c@^|} & [i•AW} iç^|•ic^ÊÔå , ælå•çi||^AÇÔå , ælå•çi||^E&SD
   ▶ V@^AW} iç^|•ic^A [-kV^} }^••^^EÔ@æcæ} [ [ \*æE\VÞD
- ► W } âç^! āc^ Á [ ~ Á Y ^ cÁÕ^ [ ! \* âæÁÇÔæ! ! [ | | c [ ] ÉÁÕŒD
- Y^•c^¦}ÁÔæ¦[|ā}æÁW}āç^¦•āc^ÁÇÔ~||[¸@^^ÊÁÞÔD

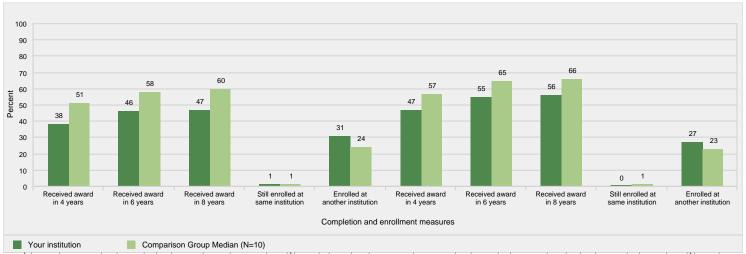
#### $\label{eq:hamiltonian} H\Y'Z][ifYg']b'h\]g'fYdcfh'\UjY'VYYb'cf[Ub]nYX'UbX'cfXYfYX']bhc'h\Y'Zc'`ck]b['hcd]W'UfYUg.$

FDÁŒå{å••å[}•ÅÇ[} ^Á~[¦Á}[]Ě[]^}Ēæå{å••å[}•Á•&@[[ •D	AAAAAAAAAAAAAAAA	Øå*ÈÁFÁæ}åÁG	AAAAAAAAAAAAAAAAAAAAAAA	Ú*ÈÁH
GDÁÙcˇå^}cÁÒ}¦[  {^}c	AAAAAAAAAAAAAA	Øā*ÈÁHÁæ}åÁI	AAAAAAAAAAAAAAAAAAAAAAAA	Ú*ÈÁHÁæ}åÁI
HDÁŒ,æ¦å•	AAAAAAAAAAAAAAA	Øā*ÈÁ Í	AAAAAAAAAAAAAAAAAAAAAAAA	Ú*ÈÁI
IDÁÔ@æ¦*^•Áæ}åÁÞ^cÁÚ¦å&^	AAAAAAAAAAAAAAA	Øā*ÈÁÎÁæ}åÁÏ	AAAAAAAAAAAAAAAAAAAAAAAA	Ú*ÈÁI
ÍDÁÙcˇå^}ckØã}æ}&ãæ kŒãå	AAAAAAAAAAAAAAA	Øā*ÈÀÌ Áæ}åÁJ	AAAAAAAAAAAAAAAAAAAAAAAA	Ú*ÈÁÍ
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ÏDÁÜ^c^}cá[}Áæ}åÅÕ¦æåઁæcá[}ÁÜæc^•	AAAAAAAAAAAAAAA	Øå*ÈÁFFÊÁFFÉÁFGÉÁFHÊÁF∣ÊÁFÍÊÁFÎÊÁFÏÁæ}åÁFÌ	AAAAAAAAAAAAAAAAAAAAAAAA	Ú*ÈÁÍÊÁÎÊÁÏÁæ}åÁÌ
ÌDÁØä}æ}&^	AAAAAAAAAAAAAAA	Øā*ÈÁFJÁæ}åÁG€	AAAAAAAAAAAAAAAAAAAAAAAA	Ú*ÈÁJ
JDÁÙŒ~~	AAAAAAAAAAAAAAA	Øā*ÈÅGFÅæ}åÅGG	AAAAAAAAAAAAAAAAAAAAAAAA	Ú*ÈÁJ
F€DÁŠâà¦æ¦â^∙E	AAAAAAAAAAAAAA	Øã*ÈÁGHÁæ}åÁGI	AAAAAAAAAAAAAAAAAAAAAAA	Ú*ÄF€



:][ifY'%+" 5 kUfX`UbX`Ybfc``a Ybh`fUhYg`cZ`bcb!Z]fgh!h] a Yž`Zi``!h] a Yž`XY[fYY#WYfh]Z]WUhY!gYY\_]b[`ibXYf[fUXiUhYg`UZhYf`, `mYUfg`cZ`Ybhfmž`Vm`DY` ghUhig.`&\$%\$!%\`Wc\cfh

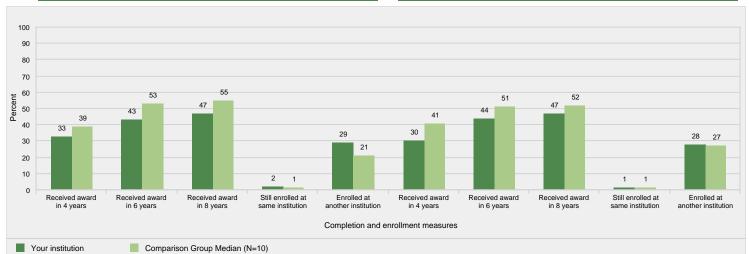




DUVÖKKE\_ælåk{^æ•^i^•kæ!^\àæ•^åk[]k@^k@³\*@^okæ\_ælåk!^&^c;^\&}ak|-k[-k^)c!^\æ}åk^}![||{^}ck{^æ•^i^•kæ!^\àæ•^åk[]k•c\*å^}c•k\_@[kåiåk}ck;^\æ}æk\*c^ikìki^^æ!•k[-k^)c!^\æ}åk^}![||{^}ck|{^æ•^i^•kæ!^\àæ•^åk[]k•c\*å^}c•k\_@[kåiåk}ck;^\æ}kæc\*lkìki^^æ!•k[-k^)c!^\æ}åk^]![||{^}ck|{^\*k\*}ekidi(^0kæ!^\åa^!c\*a^)c•k\_@[kåiki\*ck;^\æ}kæc\*le\*kiosi(^kk]æicki(^0kæ!)ki-oki(^0kæ!)ki-oki(^0kæ!

ÙUWÜÔÒKMYĚÙĖKŎ^]ætc{^}cl[-kÒå\*&ædi[}£kÞædi[}ækÔ^}c^!k-[!kÒå\*&ædi[}kÙœd\*dk\*£kN}c^\*!æc^åkÚ[\*c\*^&[}åæt^kÒå\*&ædi[}kÖæœkÙ^\*c^ {kQUÓÖÜDKKY}}c^!kG€FÌËFJÉkU\*c&[{^kT^æ\*`!^\* &[{][}^}d

:][ifY'%," 5 kUfX`UbX`Ybfc``a Ybh'fUhYg'cZ'bcb!Z]fgh!h] a Yž'dUfh!h] a Yž'XY[fYY#WYfh]Z]WUhY!gYY\_]b['ibXYf[fUXiUhYg'UZhYf', 'mYUfg'cZ'Ybhfmž'Vm'DY``ghUhig.'&\$%\$!%'Wc\cfh



DUVÒKKŒ æiák {^æ•^'!^•kæ!^hàæ•^àk[]kœ^k@i\*@^•ckæ æiák!^&^c;^\k} al^\![|| {^}ck {^æ•'!^•kæ!^hàæ•^åk[]k•c\*a^}c\*k @ [láiák] [ck!^&^iç^kæ}æ æiákæ-c^!kì\î^æ!•k[-k^}c!^kæ}ák^]![|| {^}ck {^æ•'!^•kæ!^hàæ•^åk[]k•c\*a^}c\*k @ [láiák] [ck!^&^iç^kæ}æ æiákæ-c^!kì\î^æ!•k[-k^}c!^kæ}ák^]![|| {^}ck {^æ•'!^•kæ!^hàæ•^åk[]k•c\*a^}c\*k @ [láiák] [ck!^&}iecta {^kl}]æicta {^kl}

ÙUWÜÔÒKWÉÙÉKŐ^]ætc{^}d[-ÁÒå~&ædi[}ĕkÞædi[}ækÔ^}c^!A-[!ÁÒå~&ædi[}kÙœd\*d&\*ÉW}c^\*|æc^åkÚ[\*c\*^&[}åæt^ÁÒå~&ædi[}kÖæœkÙ^\*\*c^{kQÚÒÖÙUKY}}c^!AG€FÌËFJÉKU~c&[{^\t^æ\*`!^\*

# A9H<C8C@C;=75@BCH9G

## CjYfj]Yk

V@ā•Á¦^][!chā•Aàæ•^åh[}Aåæcæh•~]]|ā^åhà^hā}•cic~cia[}•hc[hQÚÒÖÙhå~lā}\*hG€FÌËFJhåæcæh&[||^&ci[}h^^æ!ÈhÜ^•][}•^hl;æc^•h^¢&^^å^åhJJÃh-[!h{[•c•\*;c^^=EhQÚÒÖÙhØā!•chŠ[[\h!^][:c•hæch@cc]•kDD}&^•EhQÚÒÖÙhØā!•chŠ[[\h!^][:c•hæch@cc]•kDD}&^•EhQĬa\*A\*•[:{æci[}h[]h@b\*\*\*!^\*æc^ā}•cic~ci[}æ|h|^c,^|hæ}åh{æ^hà^h!^c;i•^åh-[!hæh]ā{āc^åhci{^hc@![\*\*@hc@^hQÚÒÖÙUlā[!hŶ^æ!hÜ^c;i•^åh-[!hæh]ā{āc^åhci{^hc@![\*\*@hc@^hQÚÒÖÙUlā[!hŶ^æ!hÜ^c;i•^åh-[!hæh]ā{āc^åhci{^hc@![\*\*@hc@^hQÚÒÖÙUlā[!hŶ^æ!hÜ^c;i•å[]h-^•c^{EhQĬa\*A\*\*]}]

# I gY'cZ'AYX]Ub'JU`i Yg'Zcf'7c a dUf]gcb'; fc i d

#### A]gg]b['GhUh]gh]Wg

Q-ÁæÁ-cæcá-cá&Áá-Á} [cÁ¦^] [¦c^åÁ-[¦Á^[ˇiÁā}-cácˇcá[}ÉÁc@^Á[{á--á[}Áā}åå&æc^-Ác@æcÁc@^Á-cæcá-cá&Áá-Á}[cÁ¦^|^çæ}cÁc[Á^[ˇiÁā}-cácˇcá[}Áæ}áAc@^ÁåæcæÁ¸^!^Á}[c &[||^&c^åÉAÞ[cÁæ||Á}[c^-Á{æ^Áà^Áæ]]|á&æà|^Ác[Á^[ˇ!Á!^][¦cÉ

#### IgY'cZ'=adihYX'8UhU

Œ||ÁŪŪÒÖÙÁåæcæÁæ¦^Á•`àb^&cÁc[Áā { ] `cæcā[}Á-[¦Ác[cæ|ÁÇà}•cāc`cā[}æ|DÁæ}åÁ]æ¦cāæ|ÁÇāc^{DÁ}[}¦^•^ÈÁQ-Á}^&^••æ¦^ÈÁā { ] `c^åÁçæ|`^•Á¸^¦^Á`•^åÁc[ ]¦^]æ¦^Á^[`¦Á!^][¦cÈ

### 8UhU'7cbZ]XYbh]U\]hm

QÚÒÖÙÁåæcæÁæ¦^Á} [cÁ&[||^&c^åÁ~}å^!ÁæÁ]|^å\*^Á[~Á&[}~åå^}ciæ|āc^È

#### GhiXYbh'9bfc" a Ybh

#### Ò};[||{^}&\O^[~}c•

#### ØVÒÁÒ};[||{^}c

V[cæ|ÁÒ}c^¦ã} \*ÁW}å^¦\*¦æå ˇæc^ÁÙc ˇå^}c•

V[cæ|Å^}c^!å} \*Á•cˇå^}c•Áæ;Aé•cˇå^}c•Áæckc@^Áˇ}å^!\*!æåˇæc^Á|^ç^|Ékà[c@Á-ˇ||Ĕkæ}åÁ]æ;cĒcä { ^Ék}^¸ Ác[Ác@^Áå}•cācˇcā[}Åä}Ác@^Á-æ||Ác^! { ÁÇ[¦Ác@^Á]¦ā[¦
•ˇ{ {^!Ác^! { Á @[Á!^cˇ!}^åÁi}Ác@^Á-æ||ÞÉAV@ā•Ái}&|¸Á^-Áæ||Á-ā!•cĒcā {^Á`}å^!\*!æåˇæc^Á•cˇå^}c•Ék•cˇå^}c•Ác!æ}•-^!;a}\*Ai}c[Ác@^Ái}\*cāc¸á];Aæckc@^
¸å^!\*!æåˇæc^Á|^ç^|Ékæ}åÁ}[]Ēå^\*!^^E\*Ai}c[Ác@^Ái}\*Ai}c[Ác@^Ái}\*Ai}c@^Á-æ||Á-a||ÉAU}|^Áa^\*!^^E\*!æ}ci}\*Ékæ&æå^{á&A^^æ;Á!^][;cā}\*
ä}•cācˇcā[]•Á]![çāå^Ác[cæ|Á^>c^!á}\*Á•cˇå^}cÁaæcæĒ

# 7cad'Yh]cbg

#### Ô[{]|^ca[}•Áæ}åÁÔ[{]|^c^;•

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#### Gh i XYbh': ]bUbW]U\'5]X

## Øã}æ}&ãæ|ÁŒãåÁÜ^&ã]ã^}c•Áæ}åÁŒ{[~\*}c•

Ùc å^}chØã}æ}&ãæ|hŒãåh&[||^&c•hc@^h&[~h~}å^!\*!æå~æc^h•c~å^}c•hæ¸æ!å^åhåã--^!^}chc^]^•h[-h-ã}æ}&ãæ|hæãåhæ}åhc@^hc[cæ|hæ{[~}c•h[-hæiåaæ¸æ!å^åhåi•hc@^}h&æc^h\*ec\*å^}c•hæ¸æ!å^åhåä--^!^}chc]^-haiåhæ}ååkæ[|||^&c•h&[~hæiåhæ¸æ!å^åhåæ,hæååiai[}£h\c\*å^}cho\*hæc\*hæc^hæc\*å^}ce\*h&[~hæiåhæ]åhæ[~hc@^}h&ælaiai[}£h\c\*å^}c•h[-h-ă]æ}&åæ|hŒiåh&[|||^&c•h&[~h-ă]ec#ciá {^\*}å^!\*!æå~æc^h\*ec\*å^}c•h\$a^!\*!æå~æc^h\*ec\*å^}c\*h^åciáhæ}åhæ}åhæ{[~}c•h[-hæiå£hæ}åh&[~]c•h[-h~]å^!\*!æå~æc^h\*ec\*å^}c\*h^åc\*a^}c\*h^åc\*a^}c\*h^åc\*læå\*æc^h\*ec\*å^}c\*h^åc\*a^}c\*h^åc\*a^}c\*h^åc\*a\*hæiåhæ}åhæ}åhælaiahæ}åhælaiahæ}åhælaiahæ}åhåk@[~]c•h[-h~]å^!\*!æå~æc^h\*ec\*å^}c\*h^åc\*a

# 7\Uf[Yg'UbX'BYh'Df]WY

#### ΍^;æ\*^ÁQ} •cāc ˇcā [ }æ|ÁÞ^cÁÚ;å&^

QÚÒÖÙÁ&[||^&c•ÅåæcæÁc[Á&æ|&~|æc^Áæç^¦æ\*^Á}^cÁ]¦ã&^ÁæcÁ^æ&@Áā}•cāc~cā[}Á~[¦Ác¸[Á\*¦[~]•Á[~Á~}ā^¦\*¦æå~æc^Á•c~å^}c•KÁc@[•^Áæ¸æ¦å^åÁ\*¦æ}cAæãÁæ}å c@[•^Áæ¸æ¦å^åÁVāc|^ÁQXÁ-^å^¦æ|ÁæãåÉ

΍^!æ\*^Å}^cÅ]!å&^Áå•Á&æ|& |æc^åÁ-[!Á-"||Éci { ^ÉÁ-ā! •cĒci { ^Áå^\*!^^D&^|cā-ā&æc^Ē•^^\ā} \*Á"} å^!\*!æå \*æc^•Å , @ [Å , ^!^Áæ , æ!å^åÁ\*!æ}cÁ [!Á•&@ [|æ|•@ā] Áæiå ~! [ { Åc@^Á-^å^!æ|Å\* [ç^!} { ^}cÉĀ-ēœc^D| [&æ|Å\* [ç^!} { ^}cĒÁ | !Ác@^Ái} •cāc cā [] Åæ} ^cā { ^Åå 'iā} \*Ác@^Á-'||ÁæiåÁ^^æ!ĒÁØ [!Å] \*à|ā&Ái} •cāc cā [] êÉĀc@i•Ái} &] å^• [] |Å •c \*å^}c•Å , @ [Å] æiàāAc@^Ái} ēcac^A [!Ái} Ēēcæc^A [!Ái} Ēēcæc^B [] &æc^ĒÁ Uc@^!Å• [ `!&^•Å [-Á\*!æ}cAæiåAæ!^Å^¢&] \*å^āÉĀŒç^!æ\*^Å} ^cā [] iða^Ái•Å\*^}^!æcâa^A åå \*^\* ]] iða^ĒA cæc^B [] &ælÁ\* [ç^!] { ^}cĒÁ eæc^B [] &ælÁ\* [ælÁ\*] \*Åiē} \*Åiē] \*Åiē} \*Åiē] \*

Ø[¦kc@^k]`¦][•^k[~kc@^kQÚÒÖÙk¦^][¦cå}\*Ékæååkæ¸æ¦å^åk¦^~^!•kc[k-å}æ}&åæ|kæååkc@æck¸æ•kæ¸æ¦å^åkc[Ékæ}åkæ&&^]c^åkà^Ékæk•c`å^}cÉkV@å•kæ{[`}c {æ^kåå-~^¦k-![{kc@^kæååkæ{[`}ckc@æckå•kåå•à`!•^åkc[kæk•c`å^}cÉ

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Œchả^\*!^Ē\*;æ}ci}\*hi}•cic~ci[}•Èh&[!^A!^ç^}`^•A^¢&|~å^h!^ç^}`^•A-¢.|[{ hæ~¢i|iæ!^A^}c^!];i•^•Aç^È\*Èhà[[\•c[:^•Aæ}åhā[!{ ic[:i^•DÈh@[•]icæ|•Êhæ}åi}å^]^}a^}ci]}\*hi}•cic~cic[}•Èh□[}Ëå^\*!^^E\*!æ}ci}\*hi}•cic~cic[}•Ah^c¢.]°\*hi}•Chi\*;cic[}•Ah^c¢.]°\*hi}•Chi\*;cic[}•Ah^c¢.]°\*hi}•Chi\*;cic[}•Ah^c¢.]°\*hi]\*i•^•Ai}hi]\*cic~cic[]•Ah^c¢.]°\*hi]\*i•^•Ai}hi]\*cic~cic[]•Ah^c¢.]°\*hi]\*i•^•Ai}hi]\*cic~cic[]•Ah^c¢.]°\*hi]\*i•^•Ai}hi]\*cic~cic[]•Ah^c¢.]°\*hi]\*cic~cic

### Ô[¦^ÁÒ¢]^}•^•

# 5XX]h]cbU`FYgcifWYg

 $X\hat{a} \bullet \hat{a} \wedge \hat{a} \wedge \hat{b} \wedge$ 

'=D98G'85H5':998657?'F9DCFH'