

H][Yf!8Ua Y 5b[UfU. HfU[]gWXYf'JYf'i gh]a 'Ncc'GWXkYf]b

HfUi f][Y'BUW\f]W\hYb.'H][Yf]b'5b[UfU'Ui g'Ncc'@Y]dn]['gh]fVh i bYfk UfhYh']b'GW\kYf]b"DZY[Yf']b'h]YZYf'HfUi Yf'bUW\hfU[]gW\Ya 'JcfZU``"

HfUi f][Y'BUWX f]WX hY b'YffY]WX Y b'i bg'Ui g'XYa 'Ncc'GWX k Yf]bž'k c X]Y'[Y`]YVhY'H][Yf]b'5b[UfUž'X]Y'[YVØfh]['Ui g'@Y]dn]['ghUa a hž i bYfk UfhYh'j YfghcfVYb']gh"8 Yf'J cfZU``[YgWX U\ 'Ua 'GUa ghU[ž XYa '' "'5i [i ghž'i bX'\Uh'gck c\`'6Ygi WXYf'U`g'Ui WX 'XUg DZY[YdYfgcbU``XYg'Nccg'h]YZ'VYhfcZZYb'[Ya UWXh"'5b[UfU'k Uf &\$\$-']a 'Ncc'@Y]dn]['[YVcfYb'i bX'_Ua 'Y]b'\$J\f'gdÀhYf'bUWX GWX k Yf]b"

8]Y'I a ghÀbXY']\fYg'HcXYg'g]bX'VYgcbXYfg'hfU[]gW\"'NYi[YbVYf]W\hYhYbž'XUgg'5b[UfUž'k À\fYbX'g]Y'g]W\"Ua 'FUbX'Y]bYg
HY]W\Yg'VYk Y[hYž'd`Ohn`]W\"Y]bYb'?fUa dZUbZU``'Yf`]hh'i bX']bg
K UggYf'Z]Y`"'@Y]XYf'k Uf'b]Ya UbX']b'XYf'@U[Yž'g]Y'fYW\hnY]h]['nifyhhYbž'i bX'Yg'k]fX'j Yfa i hYhž'XUgg'g]Y'YfhfUb_"''>\hnh'j Yfgi W\h'XUg@Y]Vb]n!\Dgh]hi h'ZØf'Ncc!'i bX'K]`Xh]YfZcfgW\i b[']b'6Yf`]bž'X]Y
[YbUi Y'I fgUW\Y']\fYf'?fUa dZUbZÀ``Y'ni '_`ÀfYbž'k Ug'X]Y'HfU[]_
XYg'J cfZU``g'bcW\'j YfghÀf_h"

8YhU]`g`XYg`JcfZU``g

 $\label{eq:linear_norm} Nk\ Y]\ d\ AXU[\ c[\]gWX\ Y\ 5gdY_hY\ '\ YVYb\ g]WX\ '\ Yfj\ cf.\ 'Ni\ a\ 'Y]bYb\ 'k\ Uf 5b[\ UfU\ 'k\ c\ '\ 'VY_Ubbh'ZØf']\ fY'\ i\ fgdfØb[\ ']WXY': fYi\ XY'Ua\ 'Gd]Y\ 'ž VYgcbXYfg'Ub'\ Y] "Yb''HU[\ Ybž'k\ Ybb'g]Y' cZh']bg'K\ UggYf'[\]b[\ ž'i\ a\ g]WX'UVni\ _Ø\ 'Yb'''9]b'6Ui\ a\ ghi\ a\ dZ'XYf'ØVYf'XYb'HY]WX'ZØ\ fhYž k\ i\ fXY'V]g`Ub[\ 'b]WXh'YbhZYfbhž'XU'g]Y'fY[\ Y`a\ A`*][\ 'i\ bX'g]WXYf'ØVYf X]YgYb'VU`UbW]YfhY'''8Ug'DZ'Y[\ YdYfgcbU``\UhhY'_Y]bYb'5b`Ugg$

 $[YgY\Ybz'X]Y'6YX]b[ib[Yb'ni'AbXYfbz'XU'5b[UfU'V]g'ni']\fYa \\ HcX'[Y]gh]['ibX'_OfdYf']W'U_h]j'k Uf''$

8 c W 'Ub'X]YgYa 'gW]W_gU`\ UZhYb'HU['[YgW U\'XUg I bj cfghY``VUfY"8]Y'6Ygi W Yf'gU\Ybž'k]Y'5b[UfU'd`chn`]W 'Ui g XYa '; 'Y]W [Yk]W h'[Yf]Yh'i bX']bg'K UggYf'ghØfnhY"'5`Ufa]Yfh'j cb XYb'GW fY]Yb'XYf'5bk YgYbXYb'[f]ZZ'XUg'Ncc!DYfgcbU`'gcZcfh'Y]b" 8]Y'DZY[Yfž'VY[`Y]hYh'j cb'Y]bYa 'Ncch]YfUfnhž'VY[UVYb'g]W ']bg ; Y\Y[Yž'i a 'bUW '5b[UfU'ni 'gi W Yb"'8U'b]Ya UbX'XYb'[YbUi Yb Cfh'k i gghYž'Ub'XYa 'g]Y'[YZU``Yb'k Ufž'k Uf'X]Y'G]hi Uh]cb'VYgcbXYfg j Yfnk Y]ZY`h"

8]Y'Gi W\Y'YbXYhY'gW\`]Y»`]W\'hfU[]gW\ž'U`g'g]Y'XYb'?ÒfdYf'XYf
H][Yf]b'Ui Z'XYa'; fi bX'XYg'HY]W\Yg'YbhXYW_hYb"'8Yf'A ca Ybh'XYf
9f_Ybbhb]g'k Uf'ZØf'U``Y'6YhY]`][hYb'YfgW\ØhhYfbX"'I bhYfghØhni b[
j cb'?c``Y[Yb'i bX'gW\bY``Y'9bhgW\Y]Xi b[Yb'k UfYb']bbYf\U`V
X]YgYf'Ya ch]cbU`Yb'6Y`Ughi b['j cb'\ÒW\ghYf'K]W\h][_Y]hž'i a 'X]Y
VYghY'@Ògi b['ZØf'XYb'A ca Ybh'ni 'Z]bXYb"

8Yf'GWXa Yfn'XYf'5VhY]ib[

6]gʻni a ʻ`YhnhYbʻHU[ʻk Ufʻ5b[UfUʻa YbhUʻj c``_ca a YbʻUbk YgYbXž U_h]jʻi bXʻXmbUa]gW\ž ʻYf_`ÀfhYʻNccX]fY_hcfʻH]a ʻGW\]_cfUʻ]b
Y]bYa ʻYa ch]cbUʻYbʻ6Y]hfU[ʻUi Zʻ: UWYVcc_"ʻGY]bYʻK cfhY
j YfXYi h`]W\YbʻXYbʻh]YZYbʻJ Yf`i ghžʻXYbʻXUgʻHYUa ʻYf`Y]XYhž
]bgVYgcbXYfYʻX]Yʻ< Ui dhdZY[Yf]bbYbžʻX]YʻØVYfʻ\J\fY`\]bk Y[ʻY]bY
]bb][Yʻ6Yn]Y\i b[ʻni ʻXYfʻH][Yf]bʻUi Z[YVUi hʻ\UhhYb" ʻ9gʻ]ghʻYhk Ugž
XUgʻi bgʻU``Yʻ]a ʻHYUa ʻVY`UghYhž ʻZØ[hYʻGW\]_cfU`\]bni "

8 i fW. 'X]YgY'i bYfk UfhYhY'HfU[OX]Y']gh'Ui W. 'XYf'; YXUb_Y'Ub'X]Y G]W.Yf\Y]h'i bX'XUg'K c\`Yf[Y\Yb'UbXYfYf'H]YfY']b'XYf'9]bf]W.hi b[]b'XYb'JcfXYf[fi bX'[YfØW_h"'NccX]fY_hcf'GW.]_cfU'\cV'X]Y K]W.h][_Y]h'XYg'HYUa [Y]ghg'i bX'XYg'gW.bY``Ybž'dfcZYgg]cbY``Yb <UbXY`bg']b'Y]bYf'gc`W.'_f]h]gW.Yb'G]hi Uh]cb'\Yfj cf"'8Yf'Ncc'k]fX]b'XYb'_ca a YbXYb'HU[Yb'U``Y'Jcf_Y\fi b[Yb'dfØZYb'i bX a O[`]W.Yfk Y]gY'5bdUggi b[Yb'j cfbY\a Ybž'i a 'À\b`]W.Y'JcfZÀ``Y]b'XYf'Ni _i bZh'ni 'j Yf\]bXYfb"

8 Yf 'g W a Yfn'] W Y '5 Vg W] Y X 'j cb '5 b [Uf U 'k] f X 'b] W h b i f X Ug
DZY [Yd Yfgcb U 'ž 'g cb X Yfb 'U i W 'X] Y '6 Yg i W Yf X Yg 'N c cg 'h] Y Z
VY f Ø \ f Y b "' = \ f Y '; Yg W] W h Y 'k] f X 'U 'g 'Y] b 'A U \ ba U '' Z Ø f X] Y
6 Y X Y i h i b ['X Y f 'H] Y f d Z Y [Y 'i b X '! Ø V Y f k U W i b ['] b 'N c cg 'g h Y \ Y b ž
k À \ f Y b X 'X] Y 'K] gg Y bg W U Z h Y f 'k Y] h Y f \] b 'j Y f g i W Y b ž X] Y '[Y b U i Y b
I f g U W Y b '] \ f Y f '9 f _ f U b _ i b ['n i 'j Y f g h Y \ Y b "

8 YhU]`g

6Ygi WXYb G]Y i bg Ui Z. b!U["XY