



Original

$p=2$

remove the means

Let $X_i = (x_{i1} \dots x_{ip})' = \begin{pmatrix} \cdot \\ \cdot \\ \cdot \\ \cdot \\ \cdot \end{pmatrix}$
 1D data :

$$X_i = c_i \underline{u}, \text{ for } i=1, \dots, n$$

c_i : scalar

\underline{u} : vector

put $\underline{c} = (c_1 \dots c_n)'$

Then $X = \underline{c} \underline{u}'$ Rank = 1