$$\overset{M\times T}{X} = \overset{M\times N}{A}\,S$$

$$A^{-1}X = A^{-1}AS = I\cdot S = S$$

→ $M = N$

determined case:

non-blind: A know

impossible.

blind case

A unknown.

- Ambiguity $\begin{cases}\text{scaling} \\ \text{permutation}\end{cases}$

$$X = AP\cdot P^{-1}S$$

$M = N = 2$.

$$= \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}\begin{pmatrix} s_1 \\ s_2 \end{pmatrix}$$

$$s_1 = [s_{11}\ s_{12} \cdots s_{1T}]$$

$$(a_{11}\ a_{12}\ a_{13}\ \ \ \ s_1 \cdots$$

→ Under-determined, $\underline{M < N}$,

→ even non-blind, A know.

$$A = \overset{2\times 3}{\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{pmatrix}}.$$

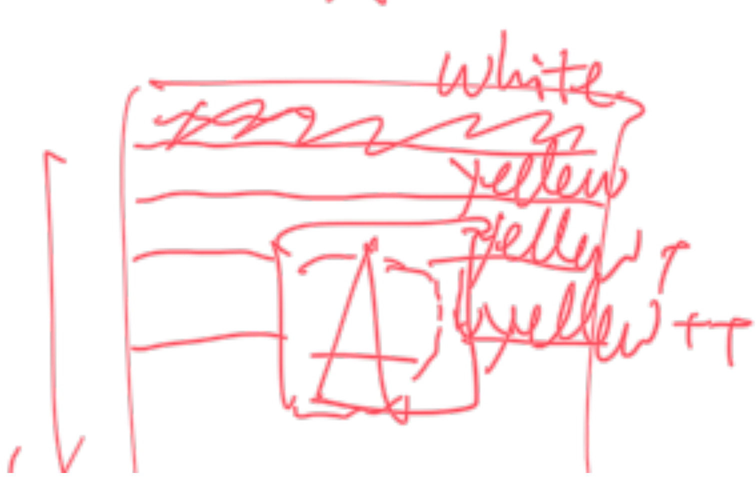
$M=2$,
$N=3$.

$$A: \overset{3\times 3}{\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}}.$$

$$\boxed{\begin{matrix} M = 3 \\ N = 3 \end{matrix}}$$

↖ rank < 3

$A = 0$.



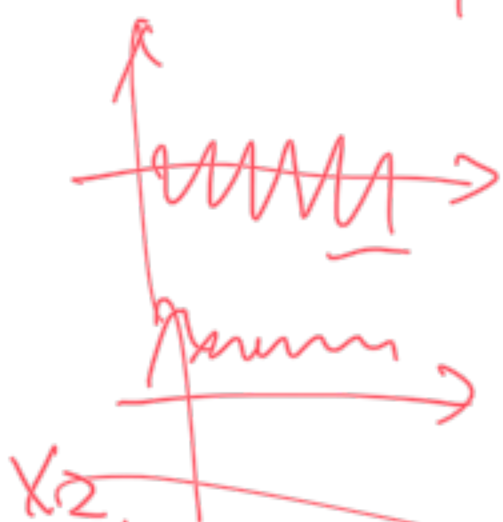
$\boxed{M = 2, \; N = 2}$.

$M = 2, \; N = 3$

$M=2,\ N=2.$

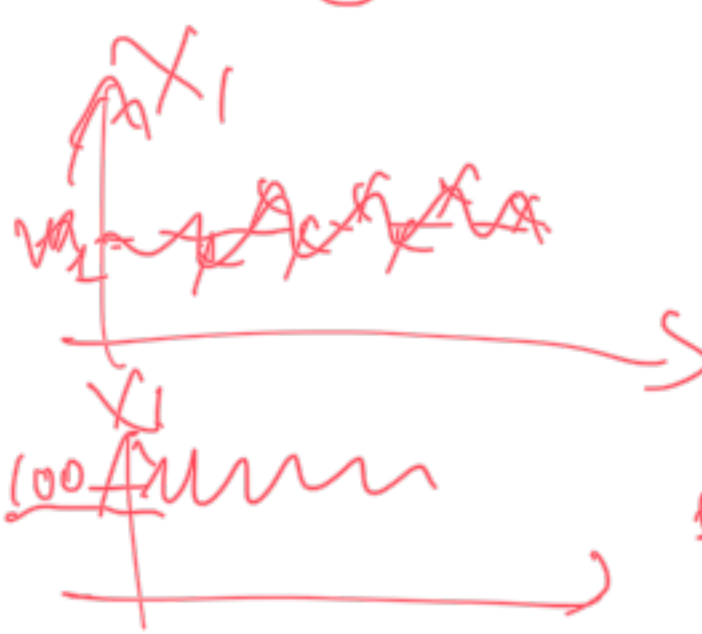
$$\begin{pmatrix} X_1 \\ X_2 \end{pmatrix} = \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} \cdot \begin{pmatrix} S_1 \\ S_2 \end{pmatrix}$$

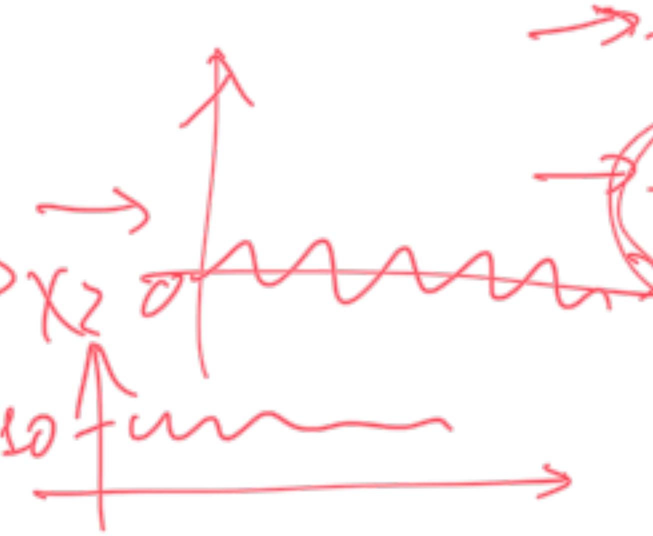
$S_{11}, S_{12}, \dots S_{1T}$



S_1, S_2, zero-mean

→ ① Remove mean of X_1, X_2.





→ ambiguity.

→ Weight.

→ Whitening Pre-prossessing.

$$X = \overset{2\times 2}{A} \cdot S$$

Assumption of independence of S

$$\boxed{S S^T = I}$$

find $W^{2\times 2}$

$$\boxed{WX = \overset{B}{WA}\, S}$$

Covariance $WX = I$.