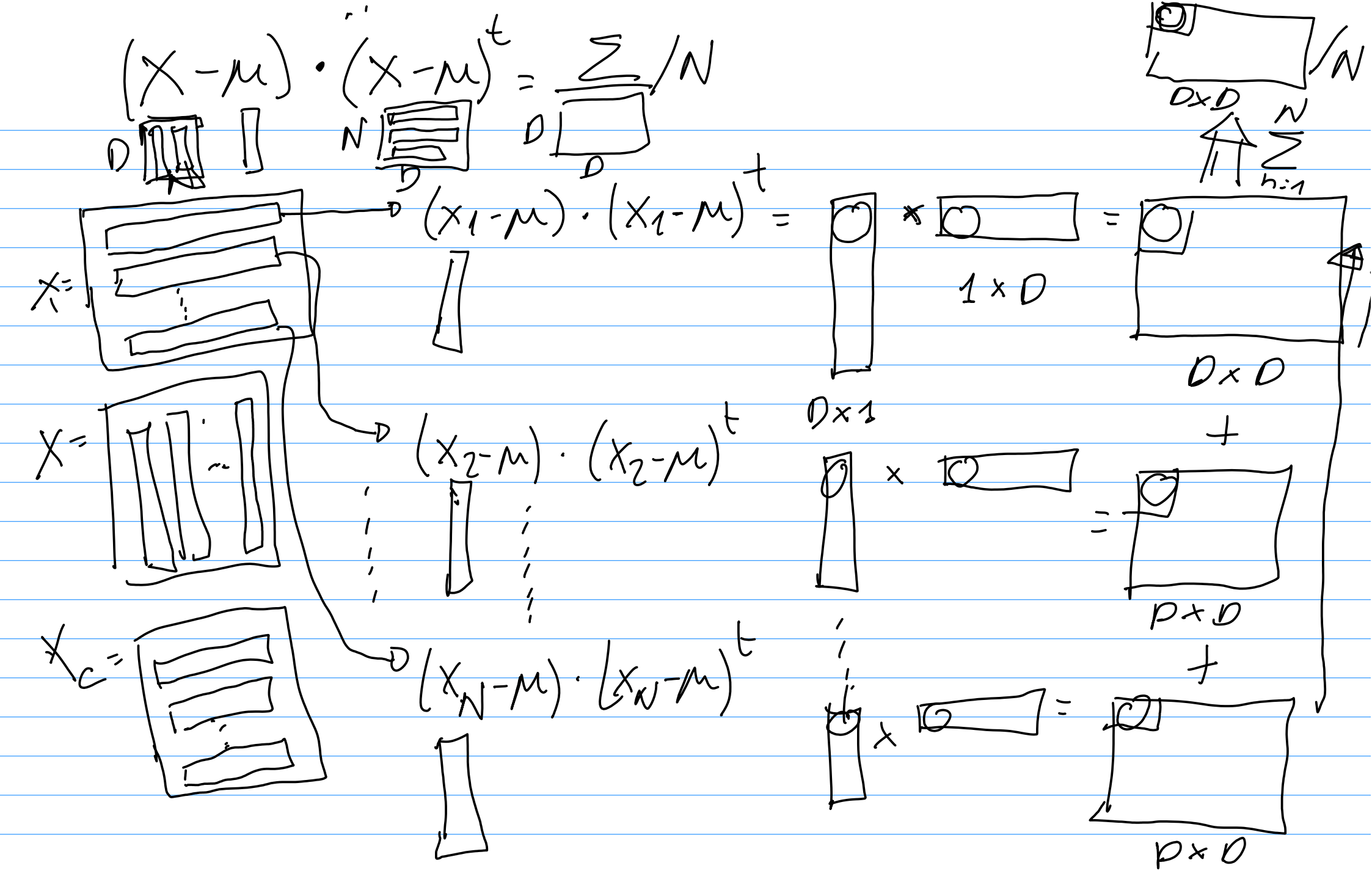
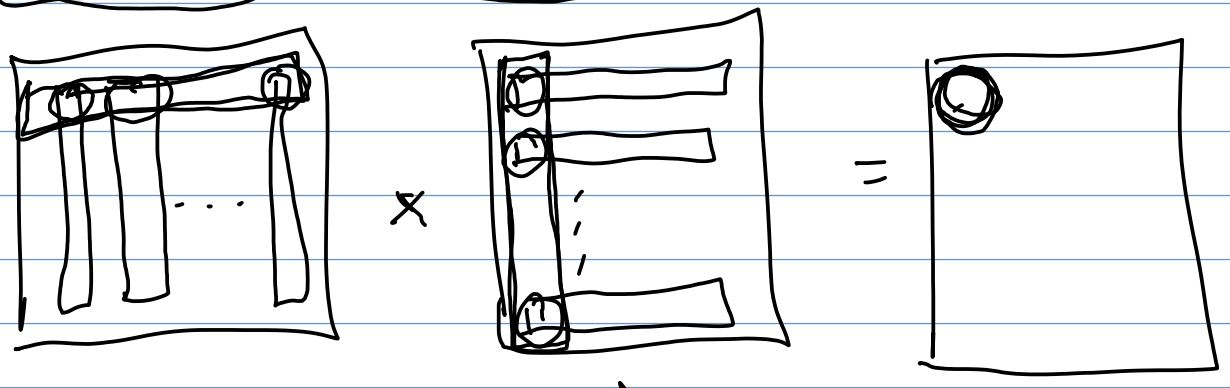
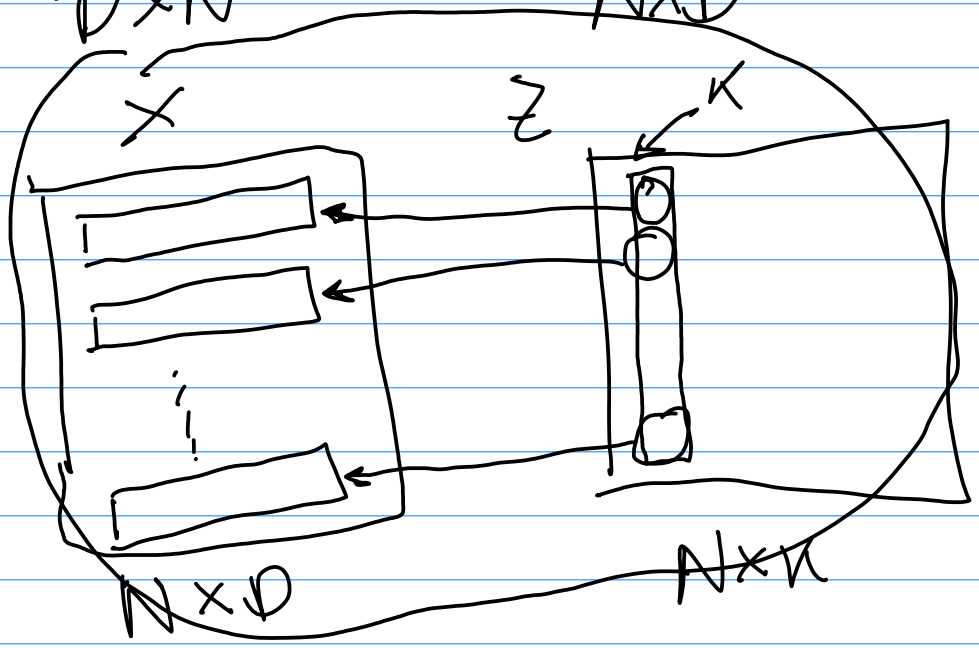

$(X-\mu)\cdot(X-\mu)^t = \Sigma$
N
D
D
D
D
D
N
$X =$
$(x_1-\mu)\cdot(x_1-\mu)^t =$
$1 \times D$
$D \times 1$
$D \times D$
$\sum_{n=1}^{N}$
$X =$
$(x_2-\mu)\cdot(x_2-\mu)^t$
$\times$
$=$
$+$
$p \times D$
$X_c =$
$(x_N-\mu)\cdot(x_N-\mu)^t$
$\times$
$=$
$+$
$p \times D$

$(X-\mu)(X-\mu)^t = \Sigma / N$

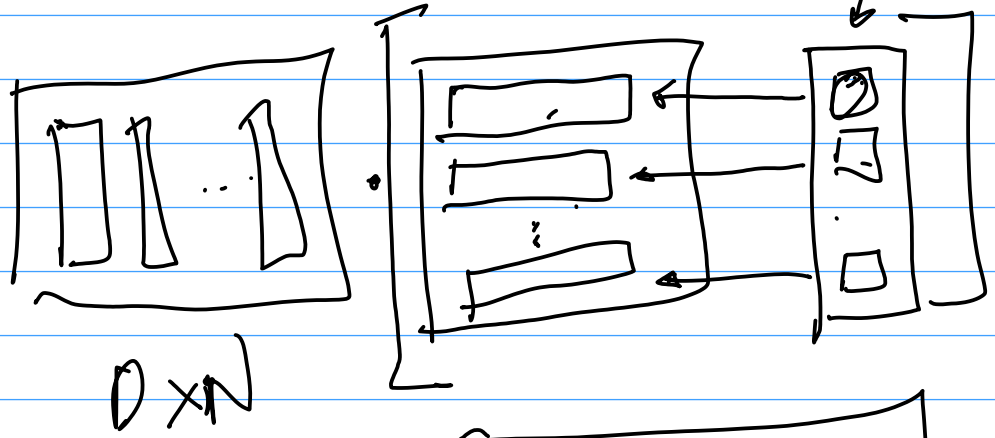
$\Rightarrow$



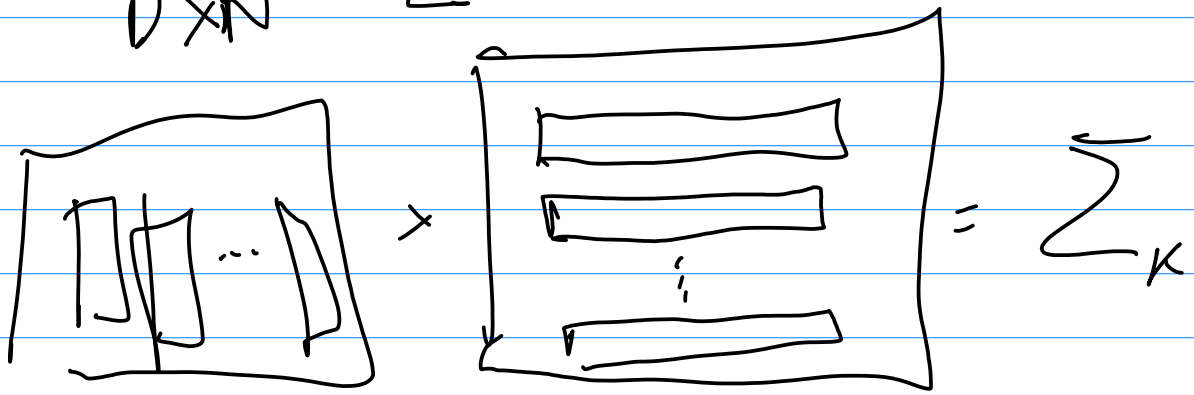
$D \times N$ $\quad$ $N \times D$ $\quad$ $D \times D$



$$(X-\mu)\cdot\left[(X-\mu)^{t}\ .*\ Z(:,k)\right]$$

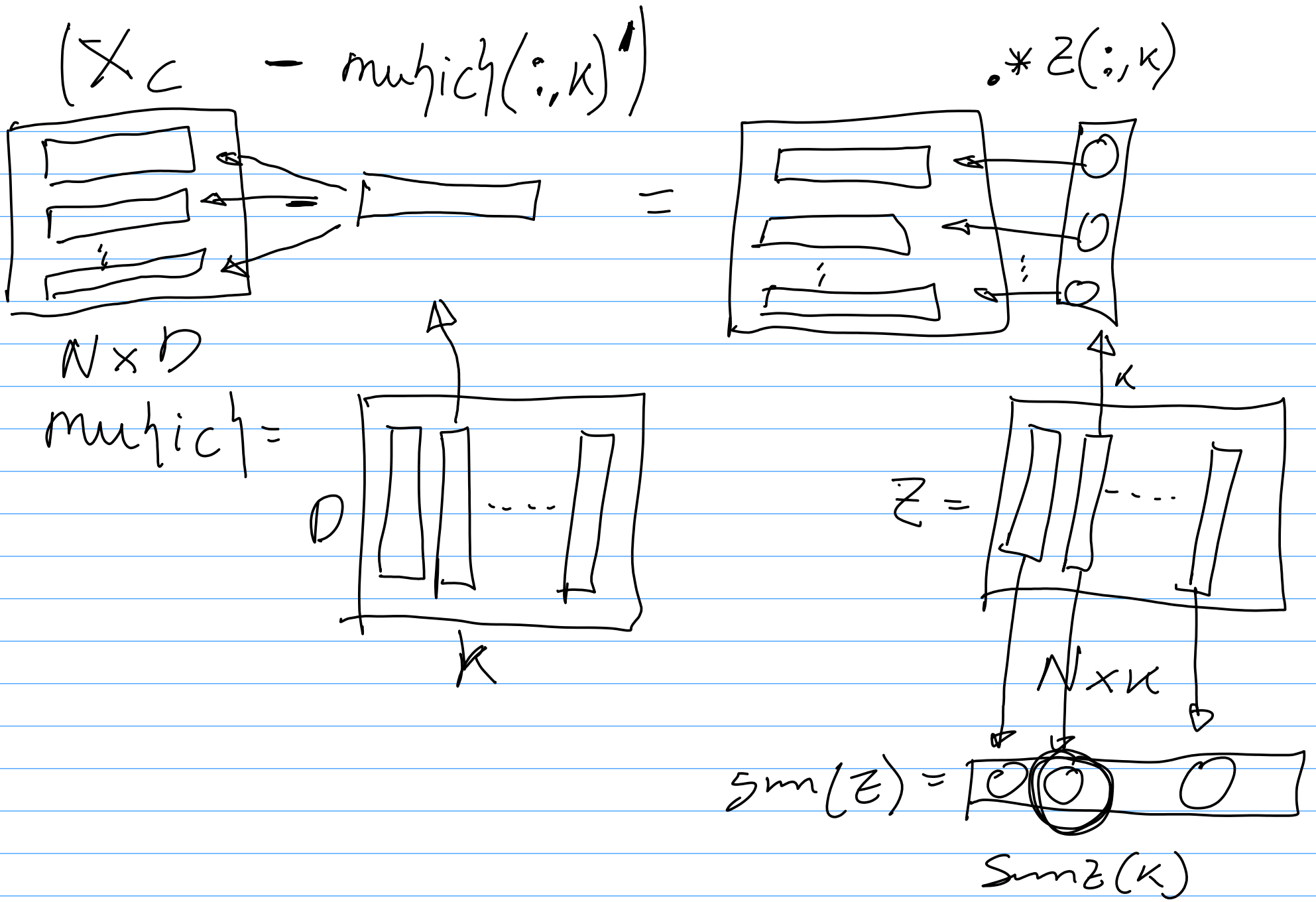


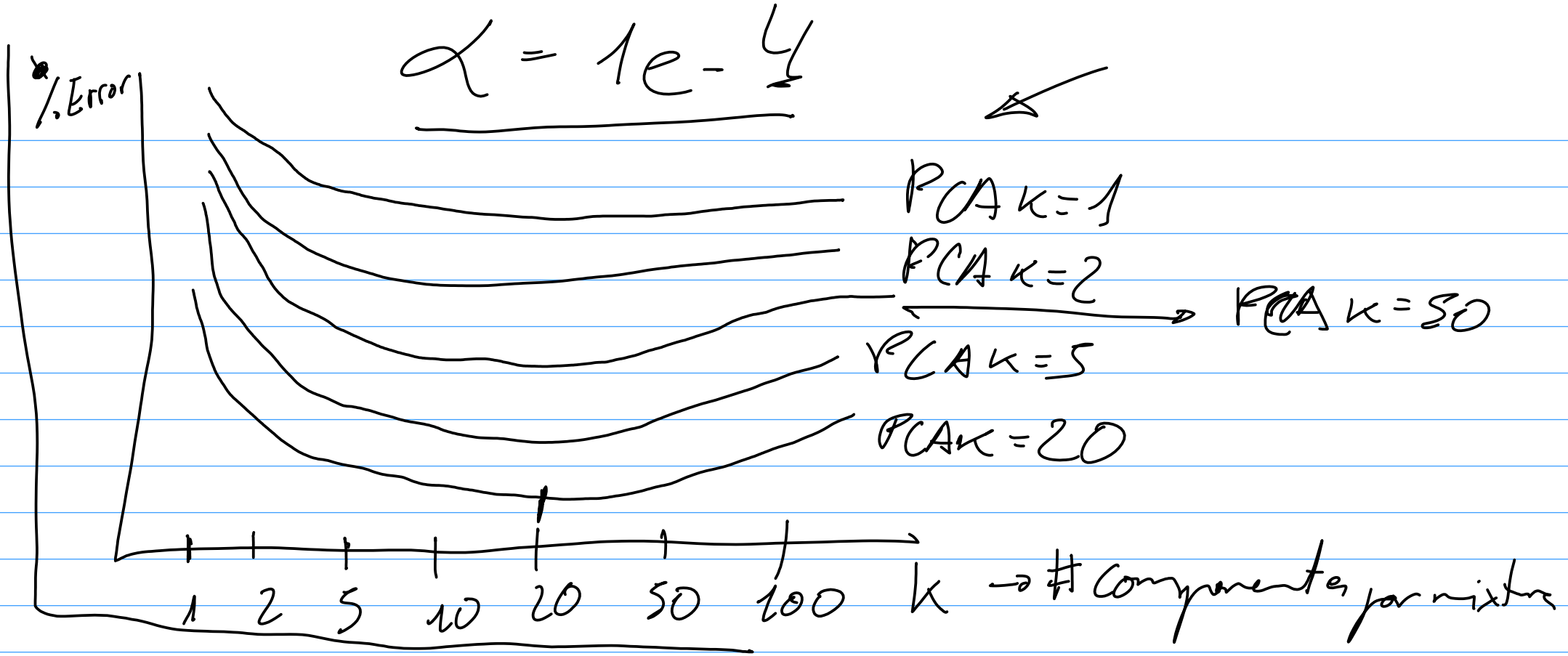
$D \times N$



$$= \sum_{k}$$

$$(X_c-\mu_{ck})\cdot\left[(X_c-\mu_{ck})^{t}\ .*\ Z(:,k)\right] / Sm(Z(:,k))$$


(X_c - mu_ic(:,k))'
.* Z(:,k)
=
N x D
mu_ic =
D
K
K
Z =
N x K
Sm(Z) =
Sm2(K)


α = 1e-4
% Error
PCA k=1
PCA k=2
PCA k=50
PCA k=5
PCA k=20
1 2 5 10 20 50 100
k → # componentes por mixtura

PCA k = 20

K = 20