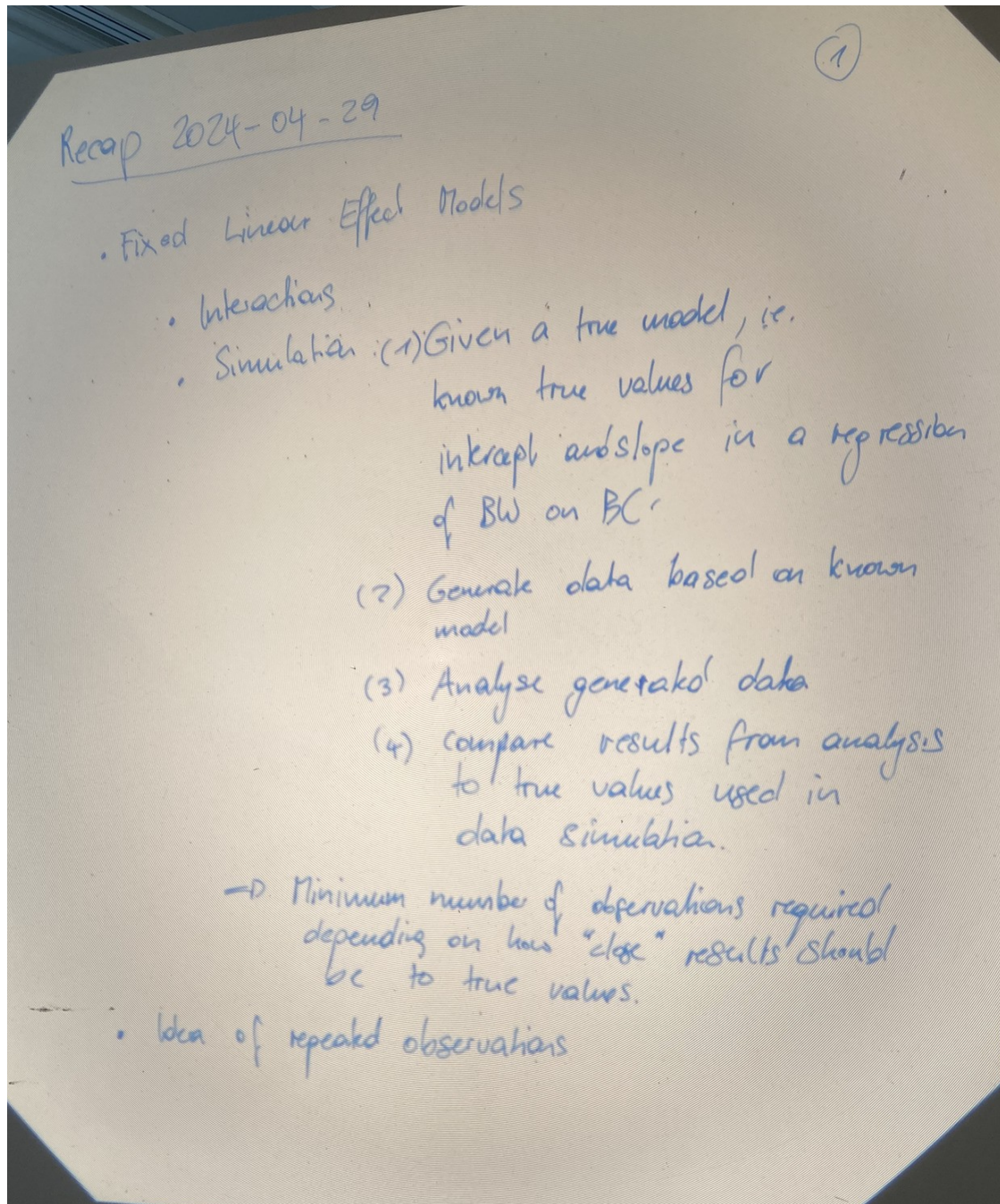
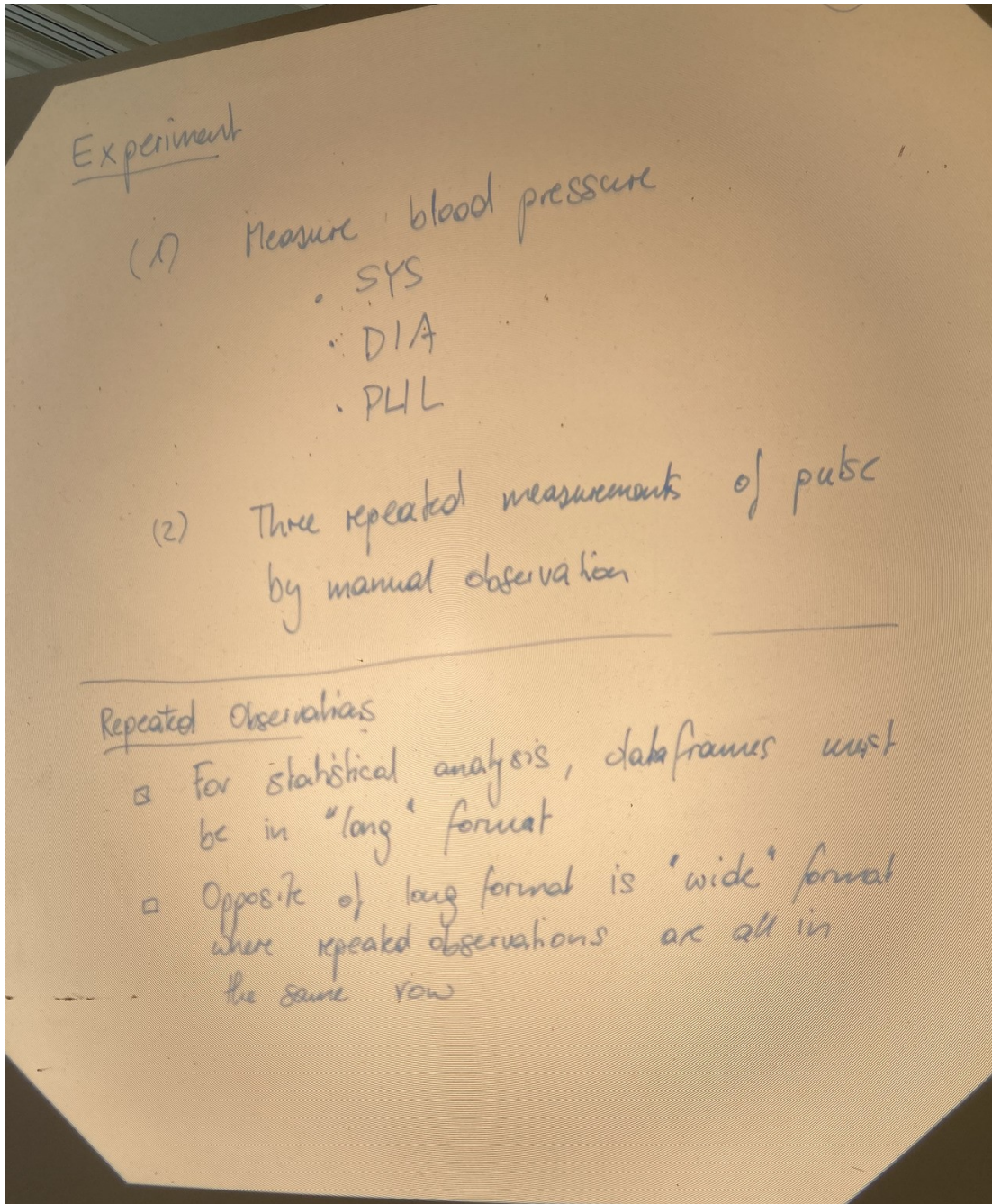


## OHP Picture 1



## OHP Picture 2



(3)

□ Regression without repeated observations

$$y = X \cdot b + e$$

$y$  → response  
 $X$  → Design =  $\begin{bmatrix} 1 & x_1 \\ 1 & x_2 \\ \vdots & \vdots \end{bmatrix}$   
 $b$  →  $\begin{bmatrix} b_0 \\ b_1 \end{bmatrix}$   
 $e$  →  $\begin{bmatrix} e_1 \\ e_2 \\ \vdots \\ e_n \end{bmatrix}$

Check via residuals plot → In R: plot(lm, b0, etc)

□ Never considered any property of  $e$   
 But, we were assuming that

$$\text{var}(e_1) = \text{var}(e_2) = \dots = \text{var}(e_n) = \sigma_e^2$$

$$\text{cov}(e_1, e_2) = \text{cov}(e_1, e_3) = \dots = 0$$

In matrix-vector notation, this is  $\text{var}(e) = I * \sigma_e^2$

$$\text{var}(e) = \begin{bmatrix} \text{var}(e_1) & \text{cov}(e_1, e_2) & \dots \\ \text{cov}(e_2, e_1) & \text{var}(e_2) & \dots \\ \vdots & \vdots & \ddots \end{bmatrix}$$

Identity matrix (points to the diagonal elements)  
 Infinite sampling concept (points to the entire matrix)  
 var( $e_n$ ) (points to the bottom right element)

OHP Picture 4

