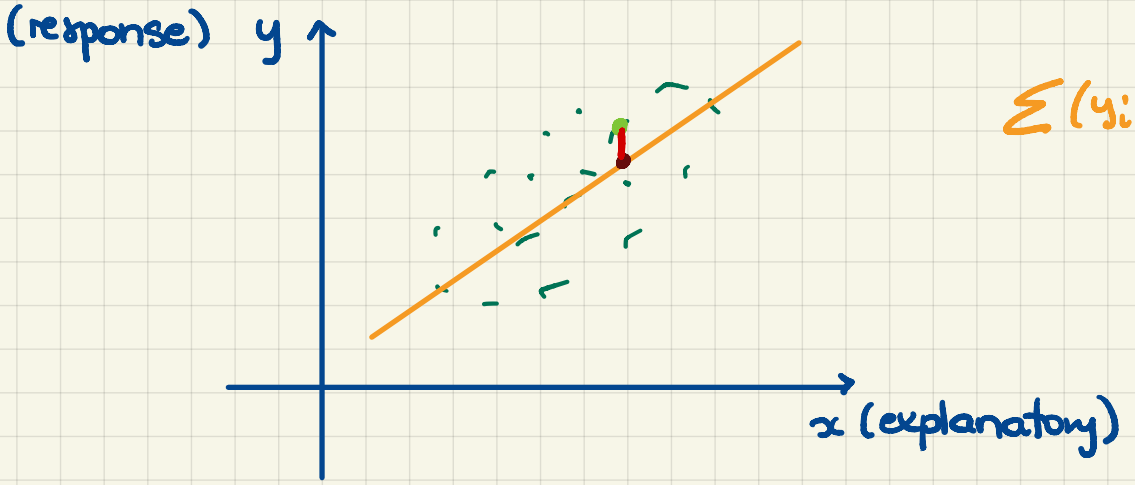
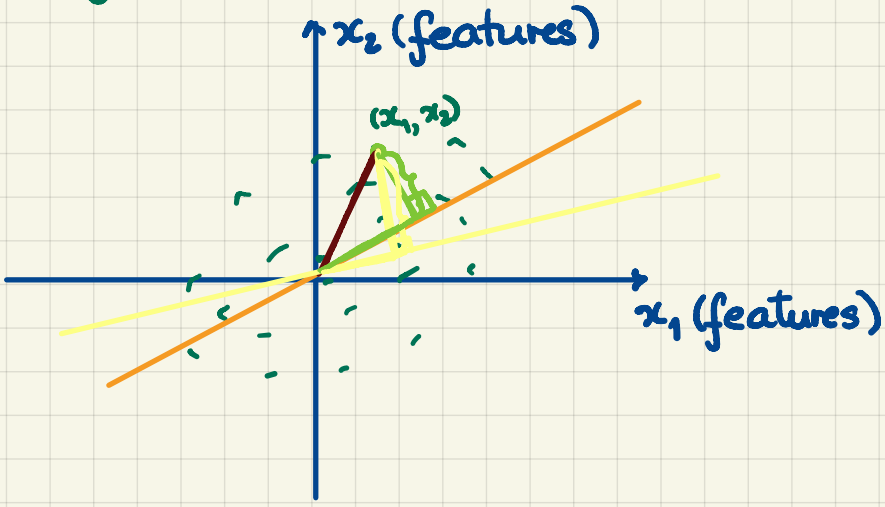
M339G: October 4th, 2024.

Geometry of Linear Regression.



$$\sum (y_i - \hat{y})^2 \longrightarrow \min$$

Geometry of Principal Components Analysis.



Singular Value Decomposition.

For a matrix A, its singular value decomposition is the factorization:

$$A = U \Sigma V^T$$

where:

- U and V both have orthonormal columns ($UU^T = I$)
- Σ is "diagonal" w/ nonnegative entries