

$$\hat{\beta} \sim N(\beta, \sigma^2(X^T X)^{-1})$$

$$\Sigma_x^{-1} X^T Y$$

$$\hat{\beta} = (X^T X)^{-1} X^T Y$$

$$\Sigma_x^{-1} X^T Y \sim$$

$$Y \sim N(0, \sigma^2 I)$$

$$Y = X\beta + \epsilon$$

$$X^T Y = (X^T X)\beta + \epsilon$$

$$\Sigma_x^{-1} X^T Y =$$

$$\Sigma_x^{-1} (X^T X)\beta +$$

use

$$\text{So } E[\Sigma_x^{-1} X^T Y]$$

$$= \Sigma_x^{-1} E[X^T X]\beta$$

$$= \underline{\underline{\beta}}$$

100 x 90

9000