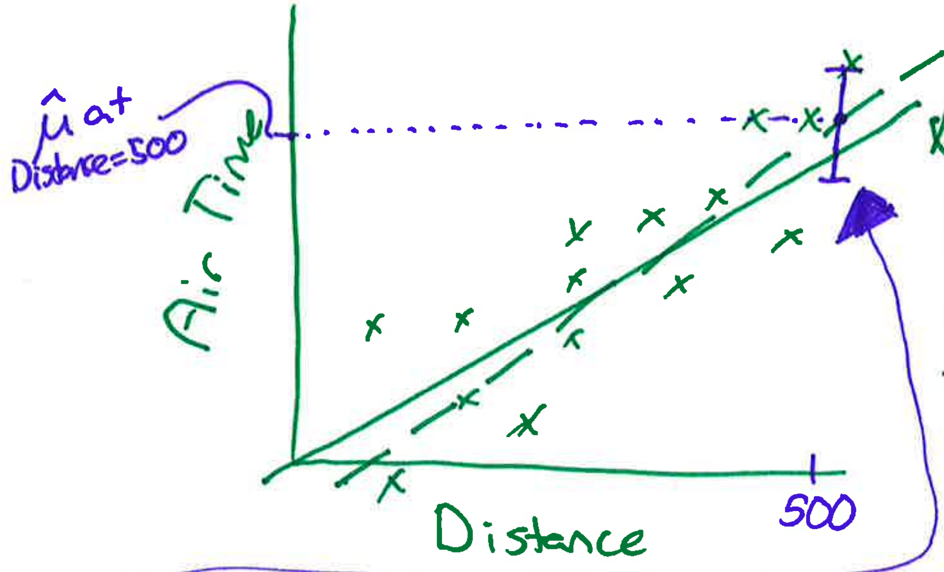

$\hat{\mu} = \hat{\beta}_0 + \hat{\beta}_1$ Distance ← estimated mean air time as a function of distance

$\underbrace{\mu = \beta_0 + \beta_1 \text{ Distance}}$

mean air time is a linear function of distance in the population of all flights

$\hat{\beta}_0$ is our best estimate of the population intercept β_0

$\hat{\beta}_1$ " " " " " " " " β_1

$\hat{\mu} = \hat{\beta}_0 + \hat{\beta}_1$ Distance " " " " – $\mu = \beta_0 + \beta_1 \cdot$ Distance

- To get the estimate at a particular distance (ex: 500 miles), plug that into the estimated equation ($\hat{\mu} = \hat{\beta}_0 + \hat{\beta}_1 \cdot 500$)
- As always, we may want a confidence interval for the population mean μ at a distance of 500:

$$[\hat{\mu} - t^* \cdot SE(\hat{\mu}), \hat{\mu} + t^* \cdot SE(\hat{\mu})]$$

- For 95% of samples like this, the interval will contain the population mean at $\mu = 500$
- $SE(\hat{\mu}) = \hat{\sigma}\sqrt{\frac{1}{n} + \frac{(x_0 - \bar{x})^2}{(n-1)s_x^2}}$, where $\hat{\sigma} = \sqrt{\frac{\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}{n-2}}$ ← sum of squared differences between observed and fitted responses

s_x^2 = sample variance of X (distances)

- Notice: $SE(\hat{\mu})$ is smallest if X_0 is near $\bar{X}$.
- Can use Scheffe or Bonferroni if we want predictions at multiple X values.