Math 316

6.7 Confidence Interval for $\mu_1 - \mu_2$

Recall for one population when finding a confidence interval for μ that we have

$$\mu = \bar{y} \pm t \cdot SE_{\bar{Y}} \quad \text{where} \quad SE_{\bar{Y}} = \frac{s}{\sqrt{n}} = \sqrt{\frac{s^2}{n}}$$

and t depends on the confidence level and degrees of freedom $df = n - 1$.

We are often interested in the *difference in two population means*. For example: (1) the difference in height between men and women; (2) the difference in thorax weight of male and female butterflies; (3) the difference in blood pressures of two groups of people: one eating fruits and veggies and the other eating a standard diet. The confidence interval for $\mu_1 - \mu_2$ is

$$\mu_1 - \mu_2 = (\bar{y}_1 - \bar{y}_2) \pm t \cdot SE_{\bar{Y}_1 - \bar{Y}_2}$$

where

$$SE_{\bar{Y}_1 - \bar{Y}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = \sqrt{SE_1^2 + SE_2^2}$$

and t depends on the confidence level and degrees of freedom df, whose **formula is given on Page 211**. Luckily for most problems the book (or in the “real world,” technology) gives us the degrees of freedom. If time, we’ll look at an example which gives us a bit of intuition about the formula for df.

See **Example 6.7.1**, etc. In class we’ll work **HW 6.7.6** and some variations.