Achievable

Categorical and quantitative data

AP STATISTICS DUMP SHEET

Categorical data:

- **Proportion z-interval:** $\hat{p} \pm z^* \sqrt{\frac{\hat{p}\,(1-\hat{p})}{n}}$
- **Proportion z-test:** $z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0\,(1-p_0)}{n}}}$
- **Proportion z-interval for a pooled proportion:**

$$\hat{p}_1 - \hat{p}_2 \pm z^* \sqrt{\hat{p}_c(1-\hat{p}_c)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

- **Pooled proportion:** $\hat{p}_c = \frac{x_1 + x_2}{n_1 + n_2}$

binary, independent, consistent probability of success.

- **Proportion z-test:**

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_c(1-\hat{p}_c)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

- **Type I error:** reject true H_0.
  Type II error: fail to reject false H_0.
  Power: probability of correctly rejecting false H_0.
- **Power increases when**
  - n increases
  - Effect size increases
  - α increases
  - Variability decreases
- **p-value interpretation:** probability, assuming H_0 is true, of getting a test statistic at least as extreme as the observed one

Quantitative data:

- **T-distribution:** use when σ is unknown and sample data is used.
- **Sample t-interval:** $\bar{x} \pm t^* \frac{s}{\sqrt{n}}$
- **Sample t-test:** $t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$
- **Sample t-interval (independent means):**

$$(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}}$$

- **Sample t-test (independent means):** $t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{{s_1}^2}{n_1} + \frac{{s_2}^2}{n_2}}}$
- **Pooled two-sample t-test :** $s_p = \sqrt{\frac{(n_1 - 1){s_1}^2 + (n_2 - 1){s_2}^2}{n_1 + n_2 - 2}}$
- **Paired t-test:** $d = \frac{x_1 - x_2}{s/\sqrt{n}}$ $\quad t = \frac{\bar{d} - \mu_{d,0}}{s_d/\sqrt{n}}$
- **Degrees of freedom:**
  - One-sample t-test: $df = n - 1$
  - Paired t-test: $df = n_{pairs} - 1$