9.1 Two sample tests for the population proportion

1. Assumptions

    - categorical response variable for two groups
    - independent random samples
    - n_1 and n_2 are large enough, there are at least five successes and five failures in each group.

2. Hypotheses

    $H_0 : p_1 = p_2$ $\qquad$ $H_a : p_1 \neq p_2$
    $\qquad\qquad\qquad\qquad p_1 < p_2$
    $\qquad\qquad\qquad\qquad p_1 > p_2$

3. Test statistic

$$z_0 = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_2} + \frac{1}{n_2}\right)}}$$

    where

$$\hat{p} = \frac{x_1 + x_2}{n_1 + n_2}$$

    (x_1 and x_2 are the number of successes in each sample)

4. P-values

    - found same way as with one sample test (use normal tables)
    - could also use critical value method

5. Conclusion

    - make one

ex : violence and the tv

ex : getting a job after graduation

9.2 Two sample tests for the population mean

1. Assumptions

    - two quantatitive response variables
    - independent random samples
    - approx normal population distributions for both samples[1]

2. Hypothesis

[1]may be dropped if samples are large and/or doing a two-sided test

$$H_0 : \mu_1 = \mu_2 \qquad\qquad H_a : \begin{array}{l}\mu_1 \neq \mu_2 \\ \mu_1 < \mu_2 \\ \mu_1 > \mu_2\end{array}$$

3. Test Statistic

$$t_0 = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

4. P-value

   - will depend on H_a
   - t_0 has the t distribution with $df \approx n_1 + n_2 - 2$.
   - or we could use the critical value method (easier to use in most cases). remember that the critical value c is found using the appropriate statement about H_a.

$H_a : \mu_1 \neq \mu_2$	use	$P\{T > c\} = \alpha/2$	reject when $t_0 > c$
$H_a : \mu_1 < \mu_2$	use	$P\{T < c\} = \alpha$	reject when $t_0 < c$
$H_a : \mu_1 > \mu_2$	use	$P\{T > c\} = \alpha$	reject when $t_0 > c$

5. Conclusion

   - make one

Example : Grades

- two students are comparing their homework scores the scores are

$$x_1 = (17, 12, 15, 23, 18, 19, 19, 17)$$
$$x_2 = (17, 17, 16, 19, 19, 20, 15, 0)$$

- test whether or not the population means are the same