T-Test

- the difference of two sample means divided by standard of error
- relevant equations: degrees of freedom
- assumptions:
  - random samples
  - independent observation
  - population variances are equal

$$t = \frac{(x_1 - x_2) - (u_1 - u_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Null Hypothesis (H_0): $u_f - u_m = 0$ → Women aren't more likely to live on campus.
Alt. Hypothesis (H_a): $u_f - u_m > 0$ → Women are more likely to live on campus.

Chi Square

Null Hypothesis (H_0): $u_f - u_m = 0$ → Women aren't more likely to live on campus.
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→ Toy Representation

Housing No $	Female	Male	Prefer Not To Say	Non-binary
off-campus	0.06	0.18	0.04	0.02
On-campus	0.18	0.52	0	0

→ Let's Say Population = 100 & Expected = $\frac{\text{row total} \times \text{column total}}{\text{overall total}} = \frac{x \cdot y}{100}$

Housing No $	Female	Male	Prefer Not To Say	Non-binary	Total
off-campus	6 (7.2)	18 (21)	4 (1.2)	2 (0.6)	30
On-campus	18 (16.8)	52 (49)	0 (2.8)	0 (1.4)	70
Total	24	70	4	2	100

→ $x^2 = \sum_i^1 \frac{(\text{observed val} - \text{expected val})^2}{\text{expected value}}$

$$x^2 = \frac{1.44}{7.2} + \frac{9}{21} + \frac{7.84}{1.2} + \frac{1.96}{0.6} + \frac{1.44}{16.8} + \frac{9}{42} + \frac{7.84}{2.8} + \frac{1.96}{1.4}$$

$$= 0.2 + 0.429 + 6.533 + 3.267 + 0.086 + 0.214 + 2.8 + 1.4$$

$$= 14.929$$

→ determine degree of freedom: 3
→ calculate p value to reject/accept hypothesis

Pearson

- measures relationship between continuous variables
- correlation as direction of relationship