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UDACITY

3 — t-Tests

3.1 t-distribution

The t-Test is best to use when we do not know the population standard deviation. Instead we use the sample standard deviation.

Definition 3.1 — t-stat. The t-Test statistic can be computed very similarly to the z-stat, to compute the t-stat we compute:

$$t = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

We also have to compute the degrees of freedom (df) for the sample: $df = n - 1$

Like the Z-stat we can use a table to get the proportion below or between a specific value. T-tests are also great for testing two sample means (i.e. paired t-tests), we modify the formula to become:

$$\frac{(x_2 - x_1) - (\mu_2 - \mu_1)}{\sqrt{\frac{(s_1^2 + s_2^2)}{n}}}$$

■ **Example 3.1**   ■

3.1.1 Cohen's d

Definition 3.2 — Cohen's d. Cohen's d measures the effect size of the strength of a phenomenon. Cohen's d gives us the distance between means in standardized units. Cohen's d is computed by:

$$d = \frac{\bar{x}_1 - \bar{x}_2}{s}$$

where $s = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$

3.2   Practice Problem

Problem 3.1   Pizza company A wants to know if they deliver Pizza faster than Company B. The following table outlines there delivery times:

Company A	Company B
20.4	20.2
24.2	16.9
15.4	18.5
21.4	17.3
20.2	20.5
18.5	
21.5	

Table 3.1: Pizza Companies Delivery Times

Problem 3.2   Use Cohen's d to measure the effect size between the two times.