ASQ CRE Prep course

Lesson II. B. 3. d.

Hypothesis Testing

Other Comparisons

A few other common comparisons

HYPOTHESIS TESTING EXTENDED

p test (proportions)

- **Bernoulli Trials**
- **Both np &n(1-p) > 5**
  - **Use normal approx.**
  - **Else use binomial**
- **Compare to fixed proportion, p_o**

$$Z = \frac{X - np_o}{\sqrt{np_o(1-p_o)}}$$

Paired Data

Difference between 2 means, t test

- **Population variance unknown**
- **Small set of paired data**
- **Calculated differences, keep sign of result**

$$d = X_1 - X_2, \text{ for each pair}$$

$$t = \frac{\bar{d}}{s_d / \sqrt{n}}$$

$$df = n - 1$$

Paired Data

2-mean, equal variance, t test

- **Same experience**
- **Same material**
- **Linked in some way**
- **Variances the same**
- **Variance unknown**

$$t = \frac{X_1 - X_2}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

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

$$df = n_1 + n_2 - 2$$

- **Pooling std devs**

Paired Data

2-mean, unequal variance, t test

- **Variances not same**
- **Variance unknown**

$$t = \frac{X_1 - X_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

- **Weighted std dev**
- **DF complex**

$$df = \frac{1}{\frac{\left(\frac{\frac{s_1^2}{n_1}}{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}\right)^2}{n_1 - 1} + \frac{\left(\frac{\frac{s_2^2}{n_2}}{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}\right)^2}{n_2 - 1}}$$

Two Variances
F test

- **Compare to variances**
- **Samples drawn from distributions having the same variance**
- **F distribution is not symmetrical**
- **Custom: place larger variance in numerator**

$$F = \frac{s_1^2}{s_2^2}$$

Now go compare stuff

Work the Examples, too

Find data to compare at work

Send over your questions

fms@accendoreliability.com

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Module 4

III. Reliability in Design and Development