Confidence Interval - Part II

ended with:

$$P_r\{\mu - t(\alpha,\nu)\cdot S < y < \mu + t(\alpha,\nu)\cdot S\} = (1-2\alpha)\cdot 100\%$$

For given confidence interval y is between
mean - (modifier)(sample std. dev) and mean +(modifier)(sample std. dev.)

t is a modifier that relates confidence + # of samples.
if you have few samples, or want high tolerance $t \uparrow$

$$t = \frac{y-\mu}{S}$$

$$t = \frac{\bar{y}-\mu}{S/\sqrt{N}}$$

$S/\sqrt{N}$ — standard deviation of $\bar{y}$

can rearrange to yield

$$\underbrace{P_r\left\{\bar{y} - t(\alpha,\nu)\frac{S}{\sqrt{N}} < \mu < \bar{y} + t(\alpha,\nu)\frac{S}{\sqrt{N}}\right\} = (1-2\alpha)\cdot 100\%}_{\text{this gives a tolerance on the true mean}}$$

Confidence interval for "Difference in Means"

$$t = \frac{[\ 1\ ] - [\ 2\ ]}{[\ 3\ ]}$$

1 dependant variable
2 "True" mean of 1
3 Std. deviation of 1

$$t = \frac{[\bar{y}_1 - \bar{y}_2] - [\mu_1 - \mu_2]}{S_p\sqrt{\frac{1}{N_1} + \frac{1}{N_2}}}$$

S_p = pooled variance

Confidence Interval - Part II

$$S_p^2 = \frac{(N_1 - 1) S_1^2 + (N_2 - 1) S_2^2}{N_1 + N_2 - 2}$$

$S_p = \sqrt{\text{above}}$

$\nu = N_1 + N_2 - 2$

$$P_r \left\{ (\bar{y}_1 - \bar{y}_2) - t(\alpha, \nu)\, S_p \sqrt{\tfrac{1}{N_1} + \tfrac{1}{N_2}} < \mu_1 - \mu_2 < (\bar{y}_1 - \bar{y}_2) + \text{same} \right\} = (1 - 2\alpha) \cdot 100\%$$

actual #'s not very important
* signs are important *

$P_r \{ -1.75 < \mu_1 - \mu_2 < -2.7 \} = 95\%$

says μ_2 is <u>always</u> greater than μ_1

$P_r \{ -0.5 < \mu_1 - \mu_2 < 2.6 \} = 95\%$

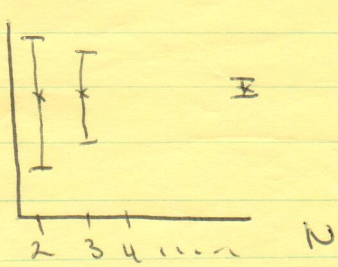
says μ_2 is sometimes bigger + smaller @ 95% confidence
"difference in means <u>not</u> statistically significant"

if #s are large, really means confidence is higher than stated

to make statistical significance, raise N_1 or N_2, or lower confidence %

* Break for Activity *

<u>HW</u>



qualitatative statements (question 3) <u>must</u> have data + calcs to back it up