Ex 1

gr 1 $N(\mu_1, \sigma^2)$ Steroid $n_1 = 8$ obs

gr 2 $N(\mu_2, \sigma^2)$ Control $n_2 = 10$ obs

90% CI for $\mu_1 - \mu_2$

$$\bar{x}_1 - \bar{x}_2 \pm c \cdot se(\bar{x}_1 - \bar{x}_2)$$

where c = 95 percentile in Student t with df = n_1 -

$df = n_1 - 1 + n_2 - 1 = 16$

$c = 1.746$

and $se(\bar{x}_1 - \bar{x}_2) = \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}\, s_p$ and $s_p^2 = \frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1 + n_2 - 1}$

$= \frac{7 \cdot 2.6^2 + 9 \cdot 2.5^2}{16}$

$= \cancel{6.47} = 2.54^2$

which gives

$$se(\bar{x}_1 - \bar{x}_2) = \sqrt{\frac{1}{8} + \frac{1}{10}}\, s_p = 0.474 \cdot 2.54 = 1.21$$

and 90% CI becomes

$$32.8 - 40.5 \pm 1.746 \cdot 1.21 = -7.7 \pm 2.1 = (-9.8, -5.6)$$

Ex 2 Same model, Observations difference in blood pressure.

Group 1: Calcium $n_1 = 10$

2: Control $n_2 = 11$

To test $H_0: \mu_1 = \mu_2$ vs. $H_A: \mu_1 > \mu_2$

Same reduction

Larger reduction with calcium

t-test, statistic $t = \frac{\bar{x}_1 - \bar{x}_2}{se(\bar{x}_1 - \bar{x}_2)} \sim t_{df}$ under H_0

$df = n_1 - 1 + n_2 - 1 = 19$

$se(\bar{x}_1 - \bar{x}_2) = \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1 + n_2 - 2}} = \sqrt{\frac{1}{10} + \frac{1}{11}} \sqrt{\frac{9 \cdot 8.74^2 + 10 \cdot 5.9^2}{19}} = 0.44 \cdot 7.4 = 3.2$

So $t = \frac{5.0 - (-0.27)}{3.2} = 1.64$, $0.1 > p > 0.05$ - Not sign.