MA 677 Permutation Tese.

Snodgrass Problem

1. $\bar{X} = 0.231$
$\bar{Y} = 0.209$.
As we can know:
Wald Statistics $= \frac{\bar{x} - \bar{y}}{\sqrt{\frac{Q_x^2}{8} + \frac{Q_y^2}{10}}} = 3.7$

$P(|Z| > 3.7) = 2 \times P(Z > 3.7) = 0.02\%$

$H_0: E(X) = E(Y)$, So we can calculate the confidence interval:

$(\bar{x} - \bar{y}) \pm 2 \sqrt{\frac{Q_x^2}{8} + \frac{Q_y^2}{10}} = [0.01, 0.03]$

2. By Rstudio we can get the p value $p = 0.02 < 0.05$.
So $E(X) \neq E(Y)$, they're not equal.

Hotdog Problem.

$X_1 \dots X_n \sim N(\mu, \sigma^2)$

$\mu_x = \frac{\sum x_i}{n} = 156.66$

$\hat{\sigma}_x^2 = \frac{\sum (x_i - \bar{x})}{n-1} = 5.12.66$

$\frac{Q_x}{\sqrt{n}} = 5.06$ with $\alpha = 5\%$

$\phi^{-1}(1-\alpha) = \phi^{-1}(95\%) = 1.729$

Therefore, Confidene Interval $= [148, 165.6]$

Reading score problem:

H_0: $\mu_1 \geq \mu_2$.

As is mentioned: $X_1 \cdots X_n \sim N(\mu_1, \sigma^2)$

$Y_1 \cdots Y_2 \sim N(\mu_2, \sigma^2)$

$$u = \frac{(m+n-2)^{\frac{1}{2}}(\bar{X}_n - \bar{Y}_n)}{\left(\frac{1}{m}+\frac{1}{n}\right)^{\frac{1}{2}}\left(S_X^2+S_Y^2\right)^{\frac{1}{2}}}$$

$$= -1.69$$

$t_{12}(90\%) = 1.4$

$u \leq -T_{12}^{-1}(90\%)$

So we reject H_0 $\mu_1 < \mu_2$