(3)

a) $$S_p^2 = \frac{m-1}{m+n-2} s_1^2 + \frac{n-1}{m+n-2} s_2^2$$

$$= \frac{(6-1)\,11.3^2}{6+8-2} + \frac{(6-1)\,8.3^2}{6+8-2}$$

$$= \underline{93.39}$$

b) $H_0: \sigma_1 = \sigma_2 \quad (\Delta_0 = 0)$

$H_a: \sigma_1 \neq \sigma_2 \quad (\Delta_0 \neq 0)$

$\therefore$ regection region $= t > t_{\alpha/2, m+n-2} \;||\; t < t_{\alpha/2, m+n-2}$

$$t = \frac{\bar{X} - \bar{Y} - \Delta_0}{\sqrt{S_p^2\left(\frac{1}{m} + \frac{1}{n}\right)}} = \frac{40.3 - 21.4 - 0}{\sqrt{93.39\left(\frac{1}{6} + \frac{1}{8}\right)}} = 3.621$$

$t_{0.05/2, 6+8-2} = -2.17$

$t > t_{\alpha/2, m+n-2}$ $\therefore$ we should regect the null hypothesis at the given signifigance level ($\alpha = 0.05$). The evidence suggests the population means are not equal.

Problem 3
calculations.

```
# a)
m <- 6
s1 <- 11.3
n <- 8
s2 <- 8.3
sp2 <- (m-1)*s1^2/(m + n - 2) + (n -1)*s2^2/(m + n - 2)

# b)

x_bar <- 40.3
y_bar <- 21.4

t <- (x_bar - y_bar) / sqrt(sp2*(1/m + 1/n))

alpha <- 0.05
t_val <- qt(alpha/2, m + n -2)

reject <- t > t_val || t < -1*t_val
```