9.9

Independent random samples from normal populations produced the following results:

$n_1 = 5$

$\bar{x} = 2.36$

$s_1^2 = 0.733$

Sample 1	Sample 2
1.2	4.2
3.1	2.7
1.7	3.6
2.8	3.9
3.0	

$n_2 = 4$

$\bar{y} = 3.60$

$s_2^2 = 0.420$

a. Calculate the pooled estimate of σ^2.
b. Do the data provide sufficient evidence to indicate that $\mu_2 > \mu_1$? Testusing $\alpha = .10$.
c. Find a 90% confidence interval for $(\mu_1 - \mu_2)$.

a. $$s_p^2 = \frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2} = 0.599$$

b. $H_0: \mu_1 \geq \mu_2$

$H_1: \mu_1 < \mu_2$ $\qquad \alpha = 0.1 \qquad R = \{t < -t_{n_1+n_2-2;\alpha}\}$

$$t = \frac{\bar{x} - \bar{y}}{\sqrt{s_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} = \frac{2.36 - 3.60}{\sqrt{0.599\left(\frac{1}{5} + \frac{1}{4}\right)}} = -2.389$$

$-t_{7;0.1} = 1.415$ We reject $H_0: \mu_1 \geq \mu_2$ at the 10% significance level.

c. $$IC_{90\%}(\mu_1 - \mu_2) = \left(\bar{x} - \bar{y} \mp t_{n_1+n_2-2;\alpha/2} \sqrt{s_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}\right)$$

$$= \left(2.36 - 3.60 \mp 1.895 \cdot \sqrt{0.599\left(\frac{1}{5} + \frac{1}{4}\right)}\right) =$$

$t_{7;0.05} = 1.895$

$$= (-1.24 \mp 0.98) = (-2.22, -0.26)$$