1. (a) The scientific hypothesis is that there is a difference between the concentration of orthophosphorous at the two stations.

   (b) The two independent normal population distributions with different mean and variance.

   (c)

$$H_0 : \mu_1 - \mu_2 = 0$$
$$H_a : \mu_1 - \mu_2 \neq 0$$

   H_a is the scientific hypothesis

   (d)

$$t = \frac{\bar{y}_1 - \bar{y}_2 - (\mu_1 - \mu_2)}{\sqrt{s_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

   For this data, we are assuming H_0 so $\mu_1 - \mu_2 = 0$. Now, we need to find the pooled variance

$$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$
$$s_p^2 = \frac{(15 - 1)(3.07)^2 + (12 - 1)(.8)^2}{15 + 12 - 2}$$
$$s_p^2 = 5.56$$

$$t = \frac{\bar{y}_1 - \bar{y}_2 - (\mu_1 - \mu_2)}{\sqrt{s_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$
$$t = \frac{3.84 - 2 - (0)}{\sqrt{5.56\left(\frac{1}{15} + \frac{1}{12}\right)}}$$
$$t = 2.01$$

   Finally, we can find the value of the test statistic

   (e) Assuming H_0, the standard estimator has a t_{25} distribution.

   (f)

$$p_- = P(t_{25}) \leq 2.01)$$
$$p_+ = P(t_{25}) \geq 2.01)$$
$$p = 2\min(p_-, p_+)$$

   because the p value is greater than .01 (1% significance), there is not enough evidence to reject the null hypothesis. In other words there is not enough evidence to suggest that the means are different.