1: A set of paired data has 36 differences with mean $\overline{x_{\text{diff}}} = 2.5$ and standard deviation $s_{\text{diff}} = 9.3$. Test whether we have significant evidence to claim the population average difference is nonzero using a significance level of $\alpha = 0.05$.

2: A set of unpaired data has the following statistics.

$$n_1 = 30 \qquad n_2 = 34$$
$$\bar{x}_1 = 96.3 \qquad \bar{x}_2 = 91.1$$
$$s_1 = 6.3 \qquad s_2 = 2.4$$

Test whether the populations' means are significantly different using $\alpha = 0.05$.

3: A set of paired data has 48 differences with mean $\overline{x_{\text{diff}}} = 32$ and standard deviation $s_{\text{diff}} = 101$. Determine a 95% confidence interval for μ_{diff}.

4: A set of unpaired data has the following statistics.

$$\begin{array}{ll} n_1 = 8 & n_2 = 11 \\ \bar{x}_1 = 55.4 & \bar{x}_2 = 72.1 \\ s_1 = 21.0 & s_2 = 15.8 \end{array}$$

Determine a 95% confidence interval for $\mu_2 - \mu_1$.

If we have a population described by random variable X, then that population's mean is $\mathrm{E}(X)$ and that population's standard deviation is $\sqrt{\mathrm{Var}(X)}$. We learned that given constants a and b and random variables X and Y, then:

$$\mathrm{E}(aX + bY) = a\,\mathrm{E}(X) + b\,\mathrm{E}(Y)$$

$$\mathrm{Var}(aX + bY) = a^2\,\mathrm{Var}(X) + b^2\,\mathrm{Var}(Y)$$

5: Let V be a normal random variable with mean 100 and standard deviation 8.

$$V \sim \mathcal{N}(100,\ 8)$$

Let W be determined by V.

$$W \sim \frac{V}{5} + \frac{V}{5} + \frac{V}{5} + \frac{V}{5} + \frac{V}{5}$$

What is the mean and standard deviation of W?

6: Let V be a normal random variable with mean 55 and standard deviation 19.

$$V \sim \mathcal{N}(55,\ 19)$$

Let W be determined by V.

$$W \sim \frac{V}{7} + \frac{V}{7} + \frac{V}{7} + \frac{V}{7} + \frac{V}{7} + \frac{V}{7} + \frac{V}{7}$$

What is the mean and standard deviation of W?

7: You have two populations (random variables): V and W.

$$V \sim \mathcal{N}(\mu = 99,\ \sigma = 31)$$

$$W \sim \mathcal{N}(\mu = 77,\ \sigma = 11)$$

A (normal) population X is determined by V and W.

$$X \sim \left(\frac{V}{3} + \frac{V}{3} + \frac{V}{3}\right) - \left(\frac{W}{6} + \frac{W}{6} + \frac{W}{6} + \frac{W}{6} + \frac{W}{6} + \frac{W}{6}\right)$$

a: Evaluate $\mathrm{E}(X)$.

b: Evaluate $\mathrm{Var}(X)$.

c: Evaluate $P(X > 25)$.

d: Determine x such that $P(X < x) = 0.888$.