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Name _____

STA 3032
Section 7370
Quiz #2
Spring, 2009

1. (8) A supplier sells synthetic fibers to a manufacturing company. A random sample of **16** fibers was selected from a shipment. The **average** breaking strength of these is **32 lb.** and the **standard deviation** is **4 lb.** Find a **90%** confidence interval for the mean breaking strength of all the fibers in the shipment.

$$\bar{y} = 32 \quad s = 4 \quad n = 16 \quad df = 15 \quad t_{.05,15} = 1.753$$

$$95\% \text{ CI: } 32 \pm 1.753 \frac{4}{\sqrt{16}} = 32 \pm 1.753$$

2. (8) The melting points of two alloys are being compared. **Twenty-five** specimens of alloy 1 were melted and produced average melting temperature of 517° F and standard deviation 2.4° F. **Twenty-one** specimens of alloy 2 were melted and produced average melting temperature of 510° F and standard deviation 2.1° F. Obtain a 95% confidence interval for the difference $\mu_1 - \mu_2$ between the two population melting points.

$$n_1 = 25 \quad \bar{y}_1 = 517 \quad s_1 = 2.4 \quad df = \nu = 43 \quad (\text{See pg 365 in textbook})$$

$$n_2 = 21 \quad \bar{y}_2 = 510 \quad s_2 = 2.1 \quad t_{.025,43} = 2.0$$

$$95\% \text{ CI for } \mu_1 - \mu_2 : 517 - 510 \pm 2.0 \sqrt{\frac{2.4^2}{25} + \frac{2.1^2}{21}} = 17 \pm 1.02$$

a. The **pooled** variance for problem 2 would have **24+20=44** degrees of freedom.

b. (**T**) The sample size $n > 30$ is considered “large” because the t distribution is close to the z distribution for more observations than 30.

c. A 95% confidence interval for the mean low temperature in January in Raleigh, North Carolina is (3.4, 5.6), in degrees C. A 95% confidence interval for the mean low temperature in degrees F would be (**38.12, 42.08**). (Freezing point of H₂O: 0° C and 32° F; Boiling point: 100° C and 212° F.)

$$y = \text{degrees F} = 32 + (9/5)(\text{degrees C}) = 32 + (9/5)x, \text{ where } x = \text{degrees C}$$

Apply this transformation to both ends of the CI (3.4, 5.6) to get answer.