Name: _____ Business Data Analysis
Date: 201-316-VA

In Class Exercise # 13: Confidence intervals

1. **Basic Calculations**

   For each of the following, use the given information to construct the required confidence interval. Assume that $\overline{x}$ is normally distributed.

   (a) $n = 11, \quad \overline{x} = 28, \quad s = 4, \quad$ Level of confidence $= 99\%$
   (b) $n = 15, \quad \overline{x} = 53, \quad s = 2, \quad$ Level of confidence $= 95\%$
   (c) $n = 38, \quad \overline{x} = 75, \quad s = 9, \quad$ Level of confidence $= 90\%$
   (d) $n = 51, \quad \overline{x} = 100, \quad s = 10, \quad$ Level of confidence $= 99.9\%$

2. **Valentines**

   On Valentine's Day, the Victorians sent "Vinegar Valentines" to their enemies. These were abusive Valentine's cards designed to make fun of the recipient which consisted of an insulting drawing and a rude poem. Some were designed for lovers who had rejected you; others were for people who had been rude to you, or for neighbours that you disliked. A huge range of insults were available: you could accuse people of being drunk, ugly, obese or stuck-up. Sadly, few vinegars survive today as recipients naturally threw them away rather than preserving them. Furthermore, many were sent without pre-payment, meaning the recipient had to pay to be insulted.

   At a local greetings card store, the manager wants to estimate the average price of a Valentine's Day cards that he has in stock. He randomly selects 20 and finds the sample mean to be \$6.99 with a sample standard deviation to be \$0.95. Assume that the prices are normally distributed.

   (a) Construct a 98% confidence interval for the price of all Valentine's Day cards in the store.
   (b) Interpret the interval in the context of the problem.
   (c) Construct a 99% confidence interval for the average price of all Valentine's Day cards in the store.
   (d) Interpret the interval in the context of the problem.
   (e) What assumptions need to be met in order for your confidence intervals to be valid?

3. **Mixed Signals**

   According to the Social Issues Research Centre, the most common mistake that people make when flirting is maintaining too much eye contact. A nonromantic glance lasts only 1.18 seconds and a flirtatious gaze lasts 2 to 3 seconds. Anything longer is uncomfortable.

   Forty-six people (23 women and 23 men) are at a speed dating event. Scientists for the Research Center secretly observe the proceedings and measure how long individuals maintain their gaze with a prospective love interest. The data collected shows that participants held their gaze on the other person for and average of 2.33 seconds with a standard deviation of 0.25 seconds.

   (a) Construct a 80% confidence interval for the average length of eye contact between the participants at the speed dating event.
   (b) Interpret the confidence interval in the context of the problem.
   (c) What is the margin of error?
   (d) Why is it not necessary to assume that the mean gaze times is normally distributed?

4. **Mountain Dew**

   In 2009, a man tried to sue PepsiCo after he allegedly found a mouse in his can of Mountain Dew. Attorneys for soft drink giant, stated that Mountain Dew could dissolve a mouse in 30 days, and showed that the man had purchased his can 74 days after the can had been sealed. The case was eventually settled out of court.

   Scientists for PepsiCo, tested 36 samples of Mountain Dew and found that it took an average of 32 days with a standard deviation of 5 days for the beverage to dissolve a mouse completely.

   (a) Construct a 99% confidence interval for the actual number of days that it takes for the soda to dissolve a mouse.
   (b) Interpret the interval in the context of the problem.
   (c) What is the margin of error?
   (d) If a person claims to have found a mouse in their can of Mountain Dew, 36 days after the soda was dispensed into the can, would they have a solid case against PepsiCola? Why or why not?