STAT 1 **Name (Print):** _____
Fall 2020
Midterm Exam 2 **Last 4 digits of SID:** _____

Instructions:

- The exam is open book and open notes. You may not receive assistance from other people, including through forums or question and answer sites.
- There are 90 possible points. Each question part shows how many points it is worth.
- You may work directly on this exam using a tablet or by printing it out. If that is not convenient, you are also welcome to work on a separate sheet of paper.
- **You must show your work to receive credit on this exam!** This allows me to give partial credit. Correct solutions with no work shown will receive no credit.
- You do not need to show your work when finding probabilities for the standard normal distribution, where you should use the online calculator.
- Since this exam is handwritten, please sign and date the honesty statement. If you are working on separate paper, please sign and make it clear that your signature represents your agreement to the honesty statement.

Honesty Statement and Pledge:

I have not given or received any aid or assistance from other students or online question and answer sites for the full duration of the exam. Everything I have written on this exam represents my own work and knowledge. I sign this knowing that infringements on the University's Academic Integrity policy may result in failure or expulsion.

Signature: _____ **Date:** _____

A group of researchers wanted to examine the relationship between pet ownership and resting heart rate. This exam considers this setting throughout.

1. Assume resting heart rate is well-approximated by a normal model with mean 80 beats per minute (bpm) and standard deviation 20. For a random sample of 10 people, what is the probability that their mean heart rate is between 75 and 85?

2. The researchers took a random sample of 10 people and asked each person if they had pets. They then measured each person's resting heart rate. Is this an experiment or an observational study?

3. For the random sample of 10 people, the data was

Pets	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
Resting Heart Rate	75	74	105	72	92	85	81	106	119	92

(a) Is **Pets** a qualitative or quantitative variable?

(b) Find the average resting heart rate for people with no pets. Then find the average resting heart rate for people with pets.

(c) Find the standard deviation of the resting heart rate for people with no pets. Then find the standard deviation of the resting heart rate for people with pets.

4. A quick Google search suggests that 67% of Americans have pets. If this is true, what is the probability that, in a random sample of 10 people, exactly 5 would have pets?

5. For the data in (3), use the confidence interval approach to test the claim that average heart rate is 80 bpm *in people without pets*. Test at the 0.05 level of significance. (Hint: use your sample statistics from Question 3!)

6. For the data in (3), use the p-value approach to test if people with pets have the same average resting heart rate as people without pets. Test at the 0.01 level of significance. (Hint: use your sample statistics from Question 3!)

7. Comment on the pet ownership and resting heart rate study. If you wanted to know whether people with pets have a different average resting heart rate than people without pets, what would you do differently?

8. What ideas related to statistics are you curious to know more about as a result of taking this class? Give an example of a question about the material that you'd like to explore further, and describe why this is an interesting question to you.

Extra Credit: The following table shows the results of an ANOVA testing the usefulness of three different brands of painkillers. There were four treatment settings: placebo, brand 1, brand 2, and brand 3. 12 participants were assigned to each treatment group.

Source	**DF**	**Sum of Squares**	**Mean Squares**	**F Value**	**P-Value**
Treatment		1231.2			0.0047
Error					
Total		4862.1			

(a) Fill in the missing information in the ANOVA table. Use the space below to show your work.

(b) What can you conclude about the painkillers?

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