Math 156 X01
Assignment 5

Covers: Sections 9.1-9.5, 10.1-10.2, 7.1-7.2
Due: Tues April 7 at 8:30am

INSTRUCTIONS:
This assignment will be marked for completion.
Solutions will be posted on the course website 24 hours after the deadline.
You may not copy the work of another person or AI.
Submit jpg or pdf files to the D2L Dropbox.

1. Use the Online Normal Distribution Calculator (linked on course website) for this problem. A certain brand of chocolate bars have masses that are normally distributed with a mean of 85 grams and a standard deviation of 0.8 grams. Find the probability that one of these chocolate bars has a mass:
a) between 84 and 86 grams
b) less than 83 grams
c) more than 86 grams

2. Use the Online Normal Distribution Calculator (linked on course website) for this problem. The time it takes programmers to complete a coding task is normally distributed with a mean of 70 minutes and a standard deviation of 10 minutes.
a) Find the value that separates the largest 6% of measurements.
b) Find the value that separates the smallest 21% of measurements.

3. Noise levels at 50 randomly-chosen downtown intersections at rush hour had a mean of 75 decibels and a standard deviation of 7.5 decibels.
a) Find a 95% confidence interval for the average noise level at a downtown intersection at rush hour.
b) Find a 99% confidence interval for the average noise level at a downtown intersection at rush hour.

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4. State whether the sampling method is a cluster sample, simple random sample, stratified random sample or systematic random sample.
a) Starting with a randomly-chosen laptop, every 10th laptop coming off a manufacturing line is selected for inspection.
b) Twenty laptops are labelled 1, 2, . . . , 20. A random number generator is used to select five laptops for inspection.
c) An electronics company makes laptops and tablets. A random sample of laptops and a random sample of tablets are selected for inspection.
d) A laptop manufacturer has 20 production lines. Three production lines are randomly selected, and every laptop made on those lines is selected for inspection.

5. State whether each study is observational or experimental.
a) A researcher asks some randomly-selected programmers how many hours they spend debugging each week, and whether they use AI tools for debugging. She then draws a conclusion about whether using AI tools shortens the average debugging time.
b) A researcher recruits 100 programmers. She randomly assigns half of them to complete debugging tasks using AI tools and the other half to complete the same tasks without AI. The researcher then compares the average time each group takes to fix the bugs.