

Carleton University
School of Mathematics and Statistics
STAT 2606: Business Statistics I - Assignment 3

Section A due Wednesday, November 10, in class

Section B due Tuesday, November 9, in class

Section C due Monday, November 8, in class

Section D due Tuesday, November 9, in class

INSTRUCTIONS:

- I. Assignments are to be handed in prior to beginning of class on the due dates listed above.
- II. For written questions, show all of your work. No credit will be given for answers without justification. Do not use MINITAB for a question unless it specifically says to do so.
- III. There will be a 10% deduction for assignments handed in late but within 24 hours after the due date. There will be a 20% deduction for assignments handed in between 24 and 48 hours after the due date. No assignments are accepted more than 48 hours after the due date. If your professor is not available to accept your assignment, you must have the undergraduate secretary (HP 4302) or other administrative personnel date and time your assignment. Students who fail to do this will receive a zero on the assignment. You must then deposit your assignment in your professor's mailbox in the mailroom (HP 4311).
 1. A professor grades his students on a normal distribution, with mean at 75 and standard deviation of 15. If there are 39 students in his class, about how many score between 80 and 90?
 2. A calculator manufacturer performs a test on its calculators and finds their working life to be normally distributed, with a mean of 2,150 hours and a standard deviation of 450 hours. What should the manufacturer advertise as the life of the calculators so that 90% of the calculators are covered?
 3. Suppose that an instructor gives an exam. This instructor wants to give those students in the top 2.5% an A on this exam. What will the cutoff be for an A, if the average score on this exam is 80, with a standard deviation of 5? Assume normality for the distribution of scores.
 4. The average time a subscriber spends reading the local newspaper is 49 minutes. Assume the standard deviation is 16 minutes and that the times are normally distributed.
 - (a) What is the probability that a subscriber will spend at least 1 hour reading the paper?
 - (b) What is the probability that a subscriber will spend no more than 30 minutes reading the paper?
 - (c) For the 10% who spend the most time reading the paper, how much time do they spend?
 5. Half of all mutual funds of a particular class charge up-front administration fees. Assuming that a random sample of 60 of these mutual funds is taken, calculate:

- (a) The mean and standard deviation of the normal approximation of the binomial.
- (b) The probability that no more than 40 of the mutual funds sampled charge an up-front administration fee.
6. While conducting experiments, a marine biologist selects water depths from a uniformly distributed collection that vary between 2.00 m and 7.00 m.
- (a) What is the probability that a randomly selected depth is less than 3.60 m?
- (b) What is the probability that a randomly selected depth is between 2.25 m and 5.00 m?
- (c) What is the expected value of the water depth?
- (d) What is the standard deviation of the water depth?
7. The length of a telemarketing phone call follows an exponential distribution with a mean length of 2 minutes.
- (a) Write down the formula for this exponential distribution.
- (b) Find the probability that the length of a randomly selected call will be between 1.5 and 2.5 minutes.
- (c) Find the probability that the length of a randomly selected call will be more than 3 minutes.
- (d) Find the probability that the length of a randomly selected call will be less than one minute.
8. Consider a random sample of 49 observations from a population with a mean equal to 25 and a standard deviation equal to 3.5.
- (a) Describe the sampling distribution of the sample mean \bar{x} . State any assumptions that you may need to make about the shape of the distribution.
- (b) Calculate $P(\bar{X} \leq 23)$.
- (c) Calculate $P(24 \leq \bar{X} \leq 26)$.
- (d) Calculate $P(\bar{X} \geq 27)$.
9. **MINITAB question: Normal approximation to binomial**
- (a) Use MINITAB to find cumulative probabilities $P(X \leq x)$ for a binomial distribution with parameters $n = 30$ and $p = 0.4$. Show your MINITAB output.
 [Note: To find the cumulative probabilities, follow the sequence:
Calc > Probability Distributions > Binomial
 (then specify the parameters in the box)]
- (b) Compute the probability $P(9 \leq X \leq 15)$ using the MINITAB output.
- (c) Use the normal approximation to the binomial distribution to calculate the probability $P(9 \leq X \leq 15)$ by hand. How does this probability compare to that in part (b)?