

Midterm
COR1-GB.1305 – Statistics and Data Analysis

The exam is open book and notes. You are also permitted use of a calculator. Each part of each problem is worth 5 points. There are 75 points total. There is no penalty for guessing incorrectly on a multiple choice problem. Partial credit may be awarded if you show work.

For the problems involving calculations, you must show all work to get full credit. For short-answer problems, there should not be any symbols in your final answer (p , n , μ , etc.), but you do not need to fully simplify your answer. It is ok to have quantities like ${}_5C_2$, $\sqrt{3.1}$, etc. in your final answers on these problems.

NYU Stern Honor Code:

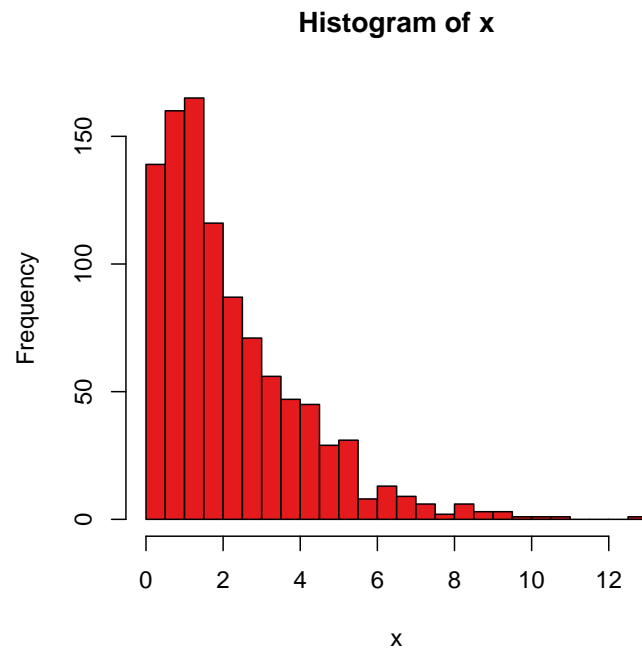
I will not lie, cheat or steal to gain an academic advantage, or tolerate those who do.

Signature: _____ Date: _____

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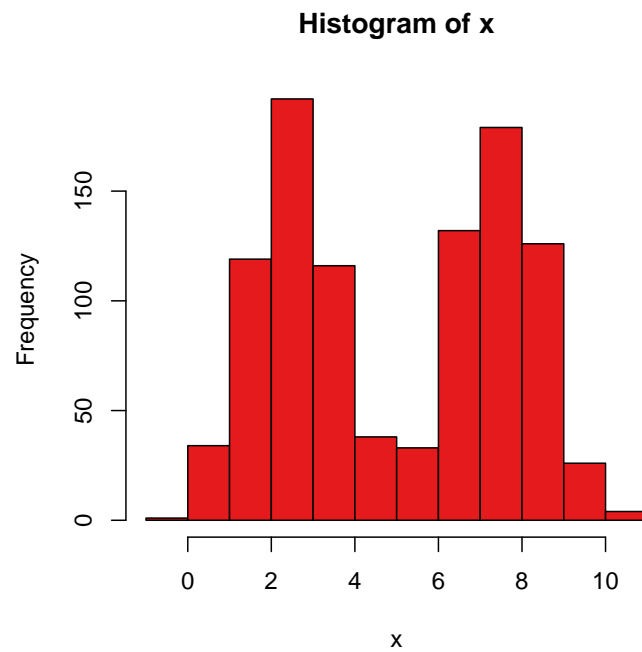
Short Answer

1. (5 points) Consider the following histogram.



Which would be more appropriate for describing this dataset: the mean or the median? Why?

2. (5 points) Consider the following histogram.



Would the sample standard deviation be appropriate for describing this dataset? Why or why not?

3. (15 points) You are planning a night out with your friends, which will include dinner and a concert. Your plan is to get dinner near your apartment, then taxi to the concert venue. A taxi will fit at most 4 people, so if there are 5–8 people in your group, you will need two taxis; if there are 1–4 people, you will only need one taxi.

Suppose that you invite 6 people (not including yourself), that each person has a 75% chance of attending, and that the attendances of your guests are independent of each other.

(a) What is the probability that you will need two taxis?

(b) What is the expected number of taxis that you will need?

- (c) Provide an interpretation for the expected number of taxis.

Multiple Choice

4. (5 points) Bitcoin is a new digital currency that constantly fluctuates in value. Suppose that every day, the value of a Bitcoin goes up, with probability 0.4, and it goes down, with probability 0.6. What is the probability that the value of a Bitcoin will go up three times and down twice in the next five days (not necessarily in that order)? Assume that the movements on different days are independent of each other.
- A. 0.23
 - B. 0.31
 - C. 0.02
 - D. 0.35
 - E. None of the above.
5. (5 points) Suppose that on any given day the return on Google stock is either -2% (with probability .6), or 0% (with probability .1) or 4% (with probability .3). Compute the expected return for one day.
- A. .67%
 - B. 0
 - C. .4%
 - D. -2%
 - E. None of the above.

6. (5 points) 66 undergraduates filled out a class survey. Of the people who filled out the survey, 29 are Finance majors and 37 are not. Suppose you randomly pick two distinct survey respondents. Consider the following two events:

A = the first student you pick is a Finance major,

B = the second student you pick is a Finance major.

Which of the following statements are true?

- A. Events A and B are independent, because observing one does not affect the probability of the other.
- B. Events A and B are independent, because $P(A \cap B) = P(A)P(B)$.
- C. Events A and B are independent, because one student's decision to major in Finance has no effect on the other student's decision.
- D. Events A and B are dependent.
- E. None of the above statements are true.

7. (5 points) If Z is a standard normal random variable, find $P(-1.5 \leq Z \leq 1)$.

- A. 0.2255
- B. 0.8413
- C. 0.06681
- D. 0.7745
- E. Not enough information to determine.

8. (10 points) Here are the reported majors for the people who filled out an undergraduate class survey, broken down by birth country.

Major	Birth Country		Total
	USA	International	
Business (Social)	10	1	11
Business (Technical)	3	3	6
Finance	22	7	29
Other	2	1	3
Undecided	12	5	17
Total	49	17	66

- (a) If we pick a random survey respondent, what is the chance that their major will be “Undecided”?

- A. $\frac{17}{49}$
- B. $\frac{17}{66}$
- C. $\frac{12}{49}$
- D. $\frac{12}{66}$
- E. Not enough information to determine.

- (b) Suppose that we pick a random survey respondent. Consider the following two events:

Finance = the selected respondent is a “Finance” major,

International = the selected respondent has an “International” birth country.

Which of the following does $\frac{7}{29}$ correspond to?

- A. $P(\text{International})$
- B. $P(\text{Finance})$
- C. $P(\text{Finance} \mid \text{International})$
- D. $P(\text{Finance} \cap \text{International})$
- E. $P(\text{International} \mid \text{Finance})$

9. (5 points) Approximately 330,000 people pass through Times Square on any given summer day. Suppose that the standard deviation of the number of people passing through is 30,000. What range typifies the number of people who pass through Times Square on a typical summer day? Assume that the distribution is symmetric and mound-shaped. Take “typical” to mean 95%.

A. 270,000 to 330,000
B. 300,000 to 360,000
C. 270,000 to 390,000
D. 330,000 to 390,000
E. None of the above.

10. (5 points) You draw a sample of size $n = 49$ from a population with mean $\mu = 2$ and standard deviation $\sigma = 14$. Let \bar{X} denote the sample mean. Approximately what is $P(|\bar{X}| < 1)$?

A. 38%
B. 68%
C. 24%
D. 5.6%
E. Not enough information to determine.

11. (5 points) A Pepsi machine in a Burger King store can be regulated so that it dispenses an average of μ ounces per cup. If the amount dispensed is normally distributed with standard deviation 0.2 ounces, what should be the setting for μ so that 8-ounce cups will overflow only 5% of the time?
- A. 7.48
 - B. 7.67
 - C. 8.33
 - D. 8.00
 - E. Not enough information to determine.
12. (5 points) Suppose that in the packaged-cereals industry, 29% of all vice presidents hold MBA degrees, 24% hold undergraduate business degrees, and 8% hold both. A vice president is to be selected at random. What is the probability that the vice president holds an MBA degree but not an undergraduate business degree?
- A. 21%
 - B. 22%
 - C. 29%
 - D. 37%
 - E. Not enough information to determine.