Midterm 1

STAT-UB.0103 – Statistics for Business Control and Regression Models

The exam is closed book and notes, with the following exception: you are allowed to bring one letter-sized page of notes into the exam (front and back). You are also permitted use of a calculator. Aside from the matching problems, each part of each problem is woth 5 points. There are 75 points total. There is no penalty for guessing incorrectly on a multiple choice problem. Partial credit may be awarded for short-answer problems.

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, λ, etc.), but you do not need to fully simplify your answer. It is ok to have quantities like $\binom{5}{2}$, $e^{-3.1}$, etc. in your final answers on these problems.

NYU Stern Honor Code:

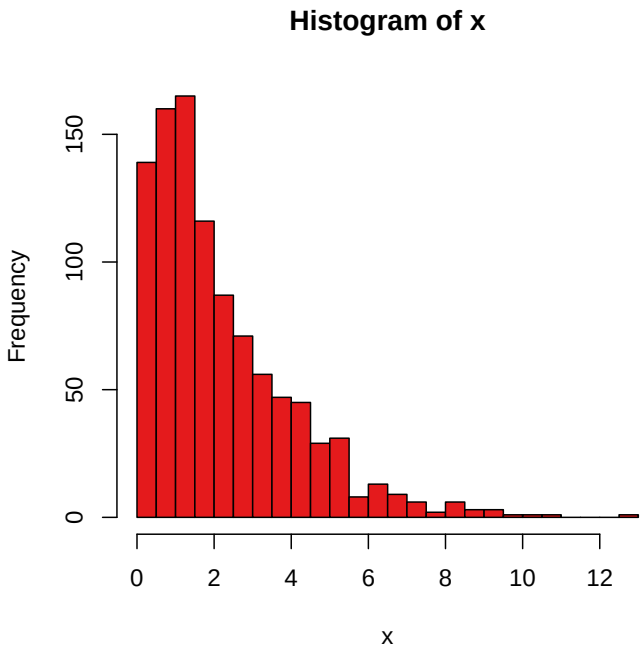
I will not lie, cheat or steal to gain an academic advantage, or tolerate those who do.

Signature: _____ Date: _____

Name: _____

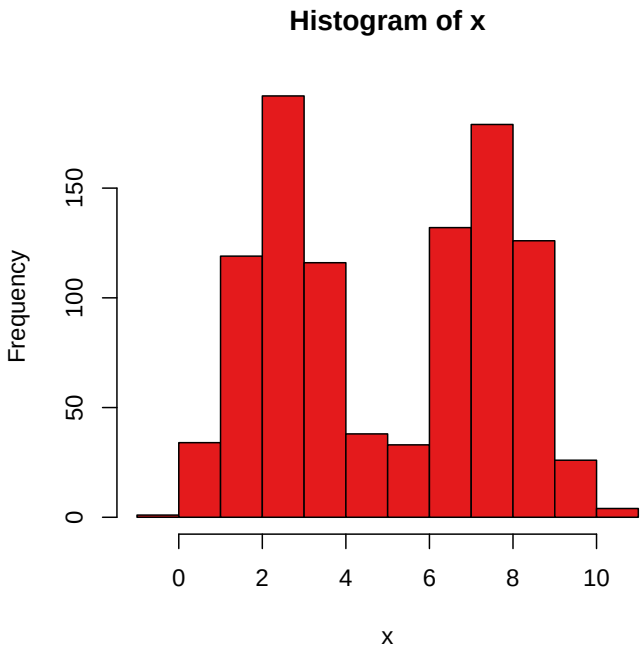
Short Answer

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) New internet memes rise to popularity at a rate of about 1 every two months. Five memes were popular in 2013: Doge, Twerking, Harlem shake, "I Quit" videos, and "What does the fox say?" Approximately what is the probability that five memes will rise to popularity in 2014? Ignore the fact that two months have already elapsed in 2014.

   A. 50%
   B. 19%
   C. 9%
   D. 16%
   E. Not enough information to determine.

7. (5 points) Of the people who filled out the class survey, 29 are Finance majors and 37 are not. Suppose you randomly pick two distinct survey respondents. Consider the following two events:

$$A = \text{the first student you pick is a Finance major,}$$
$$B = \text{the second student you pick is a Finance major.}$$

   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.

8. (5 points) Every year there is a standardized exam for people who want to be licensed actuaries. It happens that, with probability 0.45, a person will pass this exam. In the process of screening people, it turns out that among those who passed the exam, 60% had undergraduate degrees from business schools. It happens also that 30% of all those who take the exam have undergraduate degrees from business schools. Find the probability that a person who **does not have** an undergraduate degree from a business school will pass the exam.

   A. 25.7%

   B. 90.0%

   C. 38.6%

   D. 10.0%

   E. Not enough information to determine.

9. (5 points) There are five rows of seats in the lecture hall. If you decide to sit in three different rows for the next three lectures, how many ways can you choose which rows to sit in?

   A. $\binom{5}{3}$

   B. $5 \cdot 4 \cdot 3$

   C. 5^3

   D. $5!$

   E. $3!$

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

	Birth Country		
Major	USA	International	Total
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(International)
B. P(Finance)
C. P(Finance | International)
D. P(Finance $\cap$ International)
E. P(International | Finance)

11. (5 points) If you roll two standard six-sided dice, what is the expectation of the sum of the rolled values?

    A. 7

    B. 6.5

    C. 3.5

    D. 6

    E. None of the above.

12. (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.

    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