UNIVERSITY AT ALBANY
STATE UNIVERSITY OF NEW YORK

AMAT 108 Elementary Statistics
Fall 2024

Exam 1
Version A

Print Name:

UAlbany Email:

Directions: You have **80 minutes** to answer the following questions. ***You must show all necessary work*** as neatly and clearly as possible and clearly indicate your final answers.

No notes, textbooks, mobile phones or other aids are allowed. Only scientific calculators are allowed. Do not detach these pages.

For all multiple-choice questions, select **one** answer from among the choices given. No explanation is required to be shown and no partial credit will be given. Make sure to **completely** fill in the circle corresponding to your chosen answer. For all free-response questions, you **must** show all necessary work to receive full credit. An answer with no work, even if correct, will not receive full credit. Please circle or box your final answer. All work, if needed, is to be rounded to **five** decimal places.

Please indicate your section with a check mark (✓) in the left-most column.

✓	**Section**	**Instructor Name**	**Meeting Time**	**Meeting Days**	**Meeting Location**
	1724	Douglas Rosenberg	3:00PM	T/TH	ES 0140
	1725	James Lamatina	12:00PM	T/TH	LC 25
	1726	John Racquet	3:00PM	M/W	LC 2
	3414	Chris Lange	4:30PM	T/TH	HU 132
	3807	James Lamatina	11:40AM	M/W	HU 129
	3808	Luciano Medina	10:30AM	T/TH	ES 144
	3809	Tung Lam	9:00AM	T/TH	HU 124
	4551	Peter Young	8:00AM	M/W	ES 140
	4803	Peter Young	9:00AM	T/TH	ES 139
	4960	Tung Lam	12:00PM	T/TH	ES 140
	5574	Chris Lange	3:00PM	T/TH	SS 133

Exam Scoring:

Page	Possible Points	Points Earned
3	3	
4	3	
5	8	
6	22	
7	14	
Total Points	50	
Percentage		

1. A phone company is interested in customer's feedback of a certain smartphone. The company randomly chooses certain US cities and asks every customer that has this smartphone to answer a questionnaire. Identify the sampling method that was used. (1 pt.)

   ① Cluster sampling ② Simple random sampling ③ Stratified random sampling

2. Which of the following options most obviously contains bias in sampling? (1 pt.)

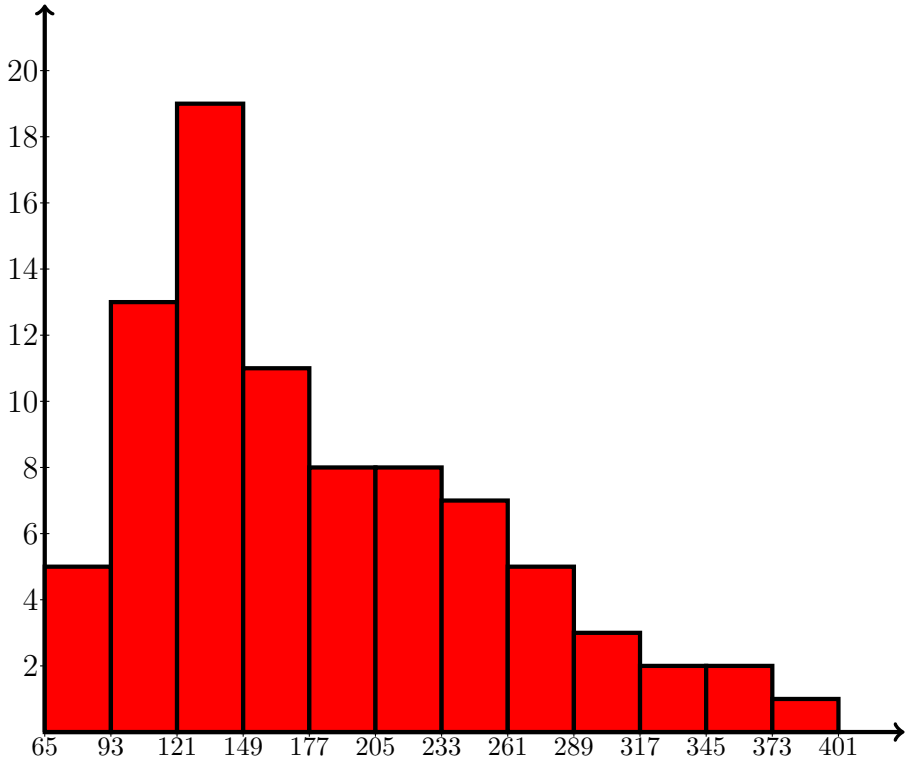
   ① A company's manager obtained results from a random sample of all job positions.

   ② A manager obtained the results from a sample of employees that were gathered using a random number generator.

   ③ From a sample of 300 employees, 89% of them replied to a survey.

   ④ None of the following options contains bias in sampling.

3. The histogram below gives the number of faculty in a sample of private colleges.



   Which of the following describes the shape of the histogram? (1 pt.)

   ① Unimodal and symmetric

   ② Unimodal and positively skewed (skewed to the right)

   ③ Unimodal and negatively skewed (skewed to the left)

   ④ Bimodal and symmetric

   ⑤ None of the above

Questions 4-6 are based on the following. From a survey of 204 adult men, 57 of them said they would like to be an actor.

4. What is the sample of the study? (1 pt.)

① The 57 adult men
② The 204 male actors
③ All adult men
④ All adult actors
⑤ The 204 adult men

5. What is the population of interest? (1 pt.)

① The 57 adult men
② The 204 male actors
③ All adult men
④ All adult actors
⑤ The 204 adult men

6. What is the relative frequency of those who said they would like to be an actor? (1 pt.)

① 3.579
② 57
③ 0.368
④ 0.279
⑤ 0.238

7. A Wendy's manager would like to record information from a sample of their customers' orders. Choose the option that describes each variable.
   (a) Type of sandwich meat (beef, chicken, fish) (1 pt.)

   ① Categorical/Qualitative ② Discrete Numerical/Quantitative

   ③ Continuous Numerical/Quantitative

   (b) Customer's wait time (in minutes) (1 pt.)

   ① Categorical/Qualitative ② Discrete Numerical/Quantitative

   ③ Continuous Numerical/Quantitative

   (c) Number of items in the order (1 pt.)

   ① Categorical/Qualitative ② Discrete Numerical/Quantitative

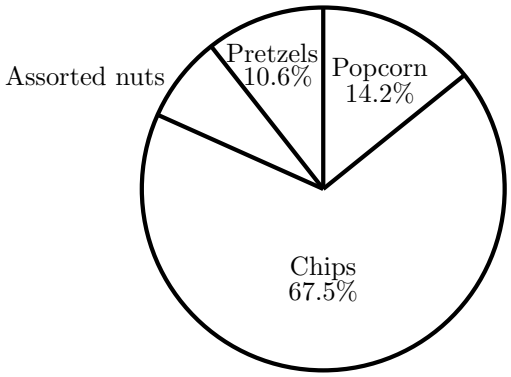
   ③ Continuous Numerical/Quantitative

   (d) Day of the week of the order (1 pt.)

   ① Categorical/Qualitative ② Discrete Numerical/Quantitative

   ③ Continuous Numerical/Quantitative

8. The pie chart below gives the person's favorite snack while watching a sporting event on TV.



   (a) What is the percentage of those who said assorted nuts were their favorite snack while watching a sporting event on TV? (2 pts.)

   (b) Suppose 6500 people are watching a sporting event on TV. How many of them will eat their favorite snack of popcorn while watching the event? **Round your answer to the nearest whole number, if needed.** (2 pts.)

9. Consider the following sample data set:

24	34	19	27	29

(a) **Fill in the blank.** The data set has $n =$____ observations. (1 pt.)
(b) Compute the sample mean. **Do not round your answer.** (3 pts.)

(c) Compute the sample standard deviation. **Round your answer to three decimal places.** (5 pts.)

10. The following sample data is the cost (to the nearest thousand) of attending law school in 2023.

58 68 80 29 55 49 59 72 41 66 78 54 53 68

(a) Fill in the table below. (6 pts.)

Minimum	Lower Quartile	Median	Upper Quartile	Maximum

(b) Find the IQR of the data set. **Show your work.** (2 pts.)

(c) State the data values that are outliers, if any. **If there are no outliers, then write "no outliers".** (5 pts.)

Part (d) is on the next page...

(d) Construct a stem-and-leaf display of the sample data. **Indicate a key for the display.** (6 pts.)

Stem	Leaf

11. In 2017, a pollution index was calculated for a sample of cities in the eastern states using data on air and water pollution. Assume the distribution of pollution indices is roughly unimodal and symmetric (a normal curve) with mean 35.6 points and standard deviation 11.2 points.

(a) What interval of pollution indices would represent the central 68% of all eastern states? (2 pts.)

(b) Approximately what percentage of eastern states would you expect to have a pollution index between 13.2 points and 69.2 points? (3 pts.)

(c) The pollution index for New York City in 2017 was 58.7 points. How many standard deviations above the mean (z-score) is this observation? **Round your answer to two decimal places.** (3 pts.)

Formula Sheet:

- Relative frequency:

$$\text{relative frequency} = \frac{\text{frequency}}{\text{sample size}}$$

- Sample mean:

$$\overline{x} = \frac{x_1 + x_2 + \cdots + x_n}{n}$$

- Sample standard deviation:

$$s = \sqrt{\frac{(x_1 - \overline{x})^2 + (x_2 - \overline{x})^2 + \cdots + (x_n - \overline{x})^2}{n-1}}$$

- IQR:

$$IQR = UQ - LQ = \text{Upper Quartile} - \text{Lower Quartile} = Q_3 - Q_1$$

- The fence equations to help in finding any mild outliers:

$$\text{Lower Fence} = LF = LQ - (1.5 \cdot IQR)$$
$$\text{Upper Fence} = UF = UQ + (1.5 \cdot IQR)$$

- z-score for observation x based on sample data or population data:

$$z = \frac{x - \overline{x}}{s} \qquad \text{or} \qquad z = \frac{x - \mu}{\sigma}$$