UNIVERSITY AT ALBANY
STATE UNIVERSITY OF NEW YORK

AMAT 108 Elementary Statistics
Spring 2025

Exam 1
Version 1

Answer Key

Directions: You have **80 minutes** to answer the following questions. ***No notes, textbooks, mobile phones or other aids are allowed. Only scientific calculators are allowed.*** 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.

Do not detach any pages. Please choose your section with a check mark (✓) in the left-most column.

✓	Instructor Name	Meeting Time	Meeting Days	Meeting Location	Section
	John Habib	11:40AM	M/W	HU 124	1651
	Seth Hulbert	09:00AM	T/TH	SS 116	3998
		12:00PM		HU 124	4046
	Tung Lam	09:00AM	T/TH	FA 126	6998
		01:30PM		TA 118	2761
	James Lamatina	01:10PM	M/W	LC 2	1648
		03:00PM		LC 25	3402
		09:00AM	T/TH	LC 3B	3209
	Chris Lange	03:00PM	T/TH	SS 255	1649
		04:30PM			1653
	Douglas Rosenberg	03:00PM	M/W	BB B006	1652
		04:30PM		HU 133	1654
	Sam Spellman	01:10PM	M/W	FA 126	1650
	Alea Wittig	10:30AM	T/TH	HU 123	3382
		12:00PM		HU 129	3399
	Peter Young	08:00AM	M/W	SS 255	3508
		11:40AM		HU 123	3406

Exam Scoring:

Page	Possible Points	Points Earned
3	3	
4	4	
5	3	
6	9	
7	12	
8	19	
Total Points	50	
Percentage		

1. Mr. Hulbert selects US states at random and asked a random sample of individuals working in each state if they have a wireless mouse. Identify the sampling method he uses. (1 pt.)

   ① Simple random sampling

   ② Stratified random sampling

   ③ Cluster sampling

   ④ None of the previous options

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

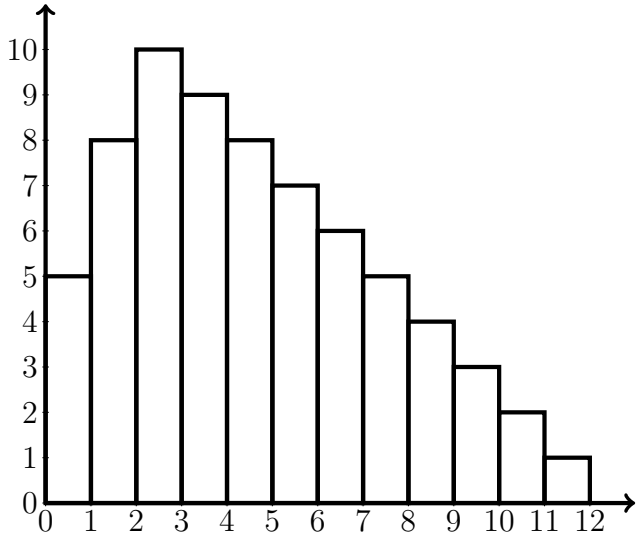
   ① Professor Habib selected Expo markers at random to study their lifespan.

   ② Dr. Spellman finds that 75% of people he selected for a telephone survey answered the phone.

   ③ Both of the previous options contain bias in sampling.

   ④ None of the previous options contains bias in sampling.

3. Mr. Rosenberg is analyzing the amount of time (in seconds) it takes the AMAT 108 course exam server to professionally craft exams. The histogram below is of the data he collects.



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

   ① Unimodal and negatively skewed (skewed to the left)

   ② Bimodal and symmetric

   ③ Unimodal and symmetric

   ④ Unimodal and positively skewed (skewed to the right)

   ⑤ None of the previous options.

Questions 4-7 are based on the following. Dr. Wittig is recording information from a survey of randomly selected UAlbany undergraduate students. Choose the option that describes each variable.

4. Number of credit hours taken in the Spring 2025 semester (1 pt.)

(1) Discrete Numerical/Quantitative
(2) Categorical/Qualitative
(3) Continuous Numerical/Quantitative
(4) None of the previous options

5. Resident/commuter student status (whether the student is a resident student or a commuter student) (1 pt.)

(1) Discrete Numerical/Quantitative
(2) Categorical/Qualitative
(3) Continuous Numerical/Quantitative
(4) None of the previous options

6. Wait time (in minutes) in line to purchase textbooks (1 pt.)

(1) Discrete Numerical/Quantitative
(2) Categorical/Qualitative
(3) Continuous Numerical/Quantitative
(4) None of the previous options

7. Total distance walked on campus in a given week (1 pt.)

(1) Discrete Numerical/Quantitative
(2) Categorical/Qualitative
(3) Continuous Numerical/Quantitative
(4) None of the previous options

Questions 8-10 are based on the following. Mr. Lam randomly surveys 63 of his students. The survey finds that 47 of them are studying biology.

8. What is the sample of the survey? (1 pt.)

① All of Mr. Lam's students
② All biology majors
③ The 63 students
④ All students
⑤ None of the previous options.

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

① All of Mr. Lam's students
② All biology majors
③ The 63 students
④ All students
⑤ None of the previous options.

10. Based on the survey, find the relative frequency of Mr. Lam's students who said they are studying biology, correct to three decimal places. (1 pt.)

① 0.254
② 1.340
③ 0.746
④ 3.937
⑤ None of the previous options.

11. As part of an experiment he is conducting, Mr. Young selects several I-beams and measures their tensile strength. The observations are below:

74	78	76	82	79

(a) **Fill in the blank.** The data set has $n =$ 5 observations. (1 pt.)

(b) Compute the sample mean. Do *not* round your answer. (3 pts.)

(1) $$\overline{x} = \frac{74 + 78 + 76 + 82 + 79}{5}$$

(2) $$= 77.8 \boxed{+1}$$

- $\boxed{+2}$ for (1) (one point for numerator and one point for denominator)

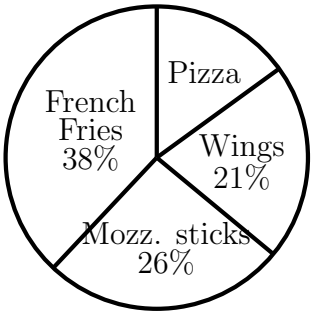
(c) Compute the sample standard deviation. Round your answer to *three* decimal places. (5 pts.)

(3) $$s = \sqrt{\frac{(74 - 77.8)^2 + (78 - 77.8)^2 + (76 - 77.8)^2 + (82 - 77.8)^2 + (79 - 77.8)^2}{4}}$$

(4) $$\approx 3.033 \boxed{+1}$$

- $\boxed{+2}$ for numerator of (3)
- $\boxed{+1}$ for denominator of 4
- $\boxed{+1}$ for taking square root

12. Mr. Lamatina likes to watch movies at home. However, he is indecisive about what snack to eat while watching his movies. Looking online, he finds the results of a survey of 18925 people organized in the pie chart below.



(a) What is the percentage of those who said pizza was their favorite snack while watching movies? (2 pts.)

(5) $$100\% - 38\% - 26\% - 21\% = 15\% \quad \boxed{+2}$$

Note. Students earn one point for showing their work and one point for the correct answer.

(b) How many of the surveyed individuals said their favorite snack to eat while watching movies is mozzarella sticks? Round your answer to the nearest whole number, where needed. (2 pts.)

(6) $$18925 \times 26\% \approx 4921 \quad \boxed{+1}$$

Note. Students earn one point for showing their work and one point for the correct, rounded answer.

13. Assume that the lifespan of a certain brand of space heater is roughly unimodal and symmetric (a normal curve) with mean 8673 days and standard deviation 1092 days.

(a) What interval of lifespans of these space heater represents the central 95% of all lifespans? (2 pts.)

(7) $$8673 \pm 2(1092) = (6489, 10857)$$

- $\boxed{+1}$ for correct interval (no partial credit)
- $\boxed{+1}$ for work shown with 2 standard deviations clearly mentioned

(b) Approximately what percentage of these space heaters would last between 5397 and 10857 days? (3 pts.)

- 5397 is three standard deviations below the mean $\boxed{+1}$
- 10857 is two standard deviations above the mean $\boxed{+1}$
- Total percentage is 97.35% $\boxed{+1}$

Note. No partial credit should be awarded.

(c) Dr. Medina purchased one of these space heaters. However, its lifespan was only 6105 days. How many standard deviations below the mean (z-score) is this lifespan? Round your answer to *three* decimal places. (3 pts.)

(8) $$z = \frac{6105 - 8673}{1092}$$

(9) $$\approx -2.352 \quad \boxed{+1}$$

- $\boxed{+2}$ for (8) (one point for numerator and one point for denominator)

Note. If the student says 2.352 standard deviations below the mean, award the point for (9).

14. Mr. Lange is an avid golfer. In fact, he is among the best 0.1% of all golfers on Planet Earth. Below is a sample of his golf scores from the 2015 calendar year.

72 67 69 90 75 73 73 74 71 70 72

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

Minimum	Lower Quartile	Median	Upper Quartile	Maximum
67	70	72	74	90

+1 for each correct entry and for correctly sorting the observations as shown below:

67 69 70 71 72 72 73 73 74 75 90

(b) Find the IQR of the data set. (2 pts.)

(10) $74 - 70 = 4$ +1

- +1 for work shown

Note. Follow any mistakes the student made in (a) above.

(c) Does the data set contain any outliers? If so, state *all* outliers. (5 pts.)

(11) $LF = 70 - 1.5(4) = 64$

(12) $UF = 74 + 1.5(4) = 80$

- +2 for showing (11) completely
- +2 for showing (12) completely
- +1 for stating that 90 is an outlier

Note.

- Students do not need to say that there are outliers. Stating them is sufficient.
- Follow any mistakes the student made in (a) and (b) above.

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

Stem	Leaf
6	79
7	01223345
8	
9	0

- +1 for showing the 6, 7, and 9 stems
- +1 for showing the 8 stem
- +1 for showing the correct leaf values
- +1 for sorting the leaves in numerical order
- +1 for leaving the 8 stem with no leaves
- +1 for key of $7|4 = 74$ or Stem: Tens and Leaf: Ones (or other similar key)

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:

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