

Statistics

FAMAT State Convention 2001

For all questions, answer “E) NOTA” stands for “none of the above.”

1. What is the mean of the data shown in the grouped frequency table below?

X	f
40-49	3
50-59	4
60-69	9
70-79	6
80-89	2

- A) 78.2 B) 64.5 C) 63.4 D) 72.5 E) NOTA
2. What is the median of the following set of data?
- {22, 18, 56, 24, 18, 20, 31, 45, 18, 91}
- A) 23 B) 22 C) 24 D) 18 E) NOTA
3. Find the solution set of the equation $Ax^2 + Bx - C = 0$, where A is the median, B is the range, and C is the mode of the following set of data.

{7, 6, 4, 5, 4, 7, 9, 6, 4}

- A) $\left\{\frac{1}{2}, \frac{-4}{5}\right\}$ B) $\left\{\frac{-3}{2}, \frac{2}{7}\right\}$ C) $\left\{\frac{1}{2}, \frac{-4}{3}\right\}$ D) $\left\{\frac{-5}{8}, \frac{2}{7}\right\}$ E) NOTA

4. What is the best description for the correlation displayed in the scatterplot below?



- A) strong positive B) strong negative C) weak positive D) weak negative E) NOTA

5. What is the best description of the distribution shown in the graph below?



- A) skewed right B) skewed left C) normal D) bimodal E) NOTA
6. Given a distribution with mean 75 and standard deviation 3.2, what is the z-score associated with the data point 77.4?
- A) .623 B) .750 C) -.623 D) -.750 E) NOTA
7. Given two events A and B, with $P(A) = 2/5$ and $P(A \cap B) = 1/4$, which of the following statements MUST be true if A and B are independent?
- A) $P(B) = 5/8$ B) $P(B) = 2/5$ C) $P(A \cap B) \geq P(B)$
- D) $P(B) = P(A) - P(A \cap B)$ E) NOTA
8. The mean score on a history test was 88% with a standard deviation of 4.1. What is the probability that a randomly chosen score is below 79%?
- A) .0685 B) .0021 C) .1560 D) .0139 E) NOTA
9. In a given factory, the probability that a bolt randomly selected from all of the bolts produced there is defective is 3.9%. What is the probability that at least one bolt is defective in a random sample of 8 bolts from this factory?
- A) .273 B) .039 C) .073 D) .727 E) NOTA
10. The probability that a child will do well in school is 81%. Given a random group of 536 students, what is the mean and standard deviation for the distribution of the number of students that do well? Answers are given as the ordered pair (mean, standard deviation).
- A) (400.28, 81) B) (101.84, .19) C) (434.16, 9.08) D) (268, 10.05) E) NOTA

11. A given town will only flood in the event that it rains. The probability that the town floods if it rains is $\frac{2}{11}$. Given that it rains 25% of the time, what is the probability that the town will flood?

- A) $\frac{8}{11}$ B) 75% C) $\frac{2}{11}$ D) $\frac{1}{22}$ E) NOTA

12. From a standard deck of 52 cards, cards are drawn at random and with replacement until a queen is drawn. What is the probability that at least 7 draws are needed?

- A) .077 B) .619 C) .571 D) .135 E) NOTA

13. Approximately what percent of the data in a normal distribution falls within one standard deviation of the mean?

- A) 75% B) 72.18% C) 70% D) 68.27% E) NOTA

14. Light bulb manufacturers A, B, C, and D produce light bulbs with mean lifetimes 1995, 1875, 1798, and 1920 hours respectively, with standard deviations of 310, 280, 120, and 375 hours respectively. Which of the manufacturer's light bulb lifetimes has the greatest relative dispersion?

- A) A B) B C) C D) D E) NOTA

15. Chris received a 93% in Calculus, a 95% in Statistics, an 89% in Chemistry, and a 90% in Computer Science. Given the distribution of grades in the four subjects in the following table, which subject did Chris do the best in relatively?

Subject	Calculus	Statistics	Chemistry	Computer Science
Mean	83	89	80	76
Standard Deviation	3	2	2.5	4.1

- A) Calculus B) Statistics C) Chemistry D) Computer Science E) NOTA

16. What is the coefficient of variation of a random variable with mean of 12 and standard deviation of 0.4?

- A) $\frac{1}{30}$ B) 4 C) 3 D) 4.8 E) NOTA

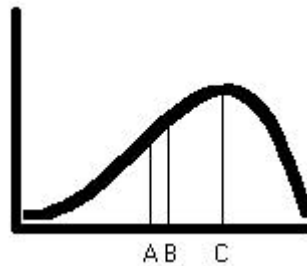
17. 0.5% of switches manufactured by a company are defective. From a random sample of 500 switches, what is the probability that 6 will be defective?

- A) .4 B) .028 C) .082 D) .339 E) NOTA

18. A sample of 300 screws manufactured in one day had a mean diameter of .761 cm and standard deviation of .036 cm. Find the 95% confidence interval for the mean diameter.

- A) $.761 \pm .004$ B) $.723 \pm .006$ C) $.761 \pm .006$ D) $.723 \pm .004$ E) NOTA

Use the following figure for questions 19-21:



19. The line marked A would best be labeled as what part of the distribution?

- A) first quartile B) median C) mean D) outlier E) NOTA

20. What is the best label for B in the above diagram?

- A) mean B) mode C) range D) median E) NOTA

21. What is the best label for C in the above diagram?

- A) outlier B) mode C) interquartile range D) mean E) NOTA

22. A Type II Error can best be described as:

- A) accepting a hypothesis when it should be rejected
 B) rejecting a hypothesis when it should be accepted
 C) inappropriately adopting a hypothesis
 D) accepting too small of a confidence interval

E) NOTA

23. With a significance level $\alpha=0.10$, which of the following would be a critical value for a two-tailed test?

- A) -1.28 B) 2.33 C) 1.645 D) -1.96 E) NOTA

24. A one-tailed test would be most appropriate in which of the following situations?

- A) testing a hypothesis that one process is significantly different from another
B) testing the hypothesis that one process is significantly worse than another
C) testing the hypothesis that there is no significant difference between the productivity of two factories
D) testing the hypothesis that one class scored significantly higher or lower than another
E) NOTA

25. To test if a coin is fair, the hypothesis that the coin is fair is accepted if in 100 tosses the number of heads is between 45 and 55 inclusive, otherwise the hypothesis is rejected. In this situation, what is the probability of a Type I Error?

- A) .2714 B) .1357 C) .3643 D) .8643 E) NOTA

26. What is the least squares regression line for the following set of points?

$$\{(2,1), (3,3), (5,7), (7,11), (9,15), (10,17)\}$$

- A) $y=3x-2$ B) $y=2.5x-1$ C) $y=2x-3$ D) $y=-x-2.5$ E) NOTA

27. Urn I contains 2 red and 5 blue balls, Urn II contains 1 red and 2 blue balls, and Urn III contains 6 red and 1 blue ball. A ball is chosen at random from one of the urns. Given that the chosen ball is blue, what is the probability that it came from Urn II?

- A) $2/3$ B) $1/3$ C) $6/7$ D) $7/16$ E) NOTA

28. How many distinguishable permutations can be made with the letters in MINNEHAHA?

- A) 45360 B) 362880 C) 90720 D) 181440 E) NOTA

The following information pertains to questions 29 and 30:

At a certain Hillsborough County school 25 students take AP European History, 26 students take AP Biology, and 34 students take AP Statistics. 11 students take both AP European History and AP Statistics, 18 take both AP Biology and AP Statistics, and 16 take both AP Biology and AP European History. 10 students take all three of these AP classes.

29. What is the probability that a randomly chosen student from this group takes AP Biology and AP Statistics but not AP European History?

- A) $1/5$ B) $18/25$ C) $4/25$ D) $7/10$ E) NOTA

30. What is the probability that a randomly selected student from this group takes AP European History but not AP Statistics?

- A) $33/50$ B) $7/25$ C) $3/25$ D) $7/10$ E) NOTA