Florida Invitational at MIDDLETON STATISTICS Individual 2.23.2008

Choose the correct answer. If the answer is not given choose E. NOTA

Use the following information to solve problems **1 thru 5**:

A toy company has two retail stores: 1 and 2. It is known that 40% of all potential customers buy products from store 1, 60% buy from store 2, 10% buy from both 1 and 2, and the rest buy from neither. Let "A" represent the event that a potential customer, randomly chosen, buys from store 1, and let "B" denote the event that the customer buys from store 2. Determine the following probabilities.

1. $P(A \cap B)$

A)0.1 B)0.4 C)0.6 D)0.9 E) NOTA

2. $P(A \cup B)$

A) 0.1 B) 0.4 C) 0.6 D) 0.9 E) NOTA

3. $P(\overline{A \cup B})$

A) 0.1 B) 0.4 C) 0.6 D) 0.9 E) NOTA

4. $P(\overline{A} \cup \overline{B})$

A) 0.1 B) 0.4 C) 0.6 D) 0.9 E) NOTA

5. $P(\overline{A} \cap \overline{B})$

A) 0.1 B) 0.4 C) 0.6 D) 0.9 E) NOTA

Use the following information to solve questions **6 and 7**:

In a mathematics competition, suppose that 3 out of the top 10 who place are females and the rest are males. Assume that the top 10 people who place are constantly placing in the top 10.

6. How many possible combinations are there for the top 2 positions?

A) 45 B) 90 C) 100 D) 720 E) NOTA

7. What is the probability that 5 males will place in the top 5 positions?

A) $\frac{3}{10}$ B) $\frac{7}{10}$ C) $\frac{1}{12}$ D) $\frac{11}{12}$ E) NOTA

8. Suppose that a group of 10 kids are dressing up for Halloween, but there are only 3 characters to choose from: Dark Nader, Luke Moonwalker, and Yoda Ban. If there are only 7 costumes

available for Dark Nader, 2 for Luke Moonwalker, and 1 for Yoda Ban, how many ways can the kids be dressed for Halloween?

A) 14 B) 35 C) 210 D) 360 E) NOTA

9. Which option states that events A and B are independent?

A) P(AUB) = P(A)+P(B) C) P(AUB) = P(A)+P(B) – P(A $\cap$ B) E) NOTA

B)P(AandB) = P(A)P(B) D) P(AandB) = P(A)P(B|A)

10. Which option states that events A and B are disjoint?

A) P(AUB) = P(A)+P(B) C) P(AUB) = P(A)+P(B) – P(A $\cap$ B) E) NOTA

B)P(AandB) = P(A)P(B) D) P(AandB) = P(A)P(B|A)

The chart below is for #11

X	10	20	30	40
P(X)	0.10	0.25	X	0.45

11. What is the expected value of the random variable in the table above?

A)30 B)20 C) 25 D) Does Not Exist E) NOTA

Use the following information to solve for problems **12 thru 15**

Assume heights of the "Autobots," from Transformers, follow a Normal Distribution curve with population mean of 250 in. and σ^2 = 100 in.

12. What proportion of Autobots have heights in between 230 and 260 in.?(Round to the thousandths)

A)0.080 B) 0.119 C)0.683 D) 0.819 E) NOTA

13. A certain Autobot has a height on the 97.13 percentile. How tall is he? (Round to the whole number)

A)260 B)269 C) 280 D)440 E) NOTA

14. A certain Autobot is chosen at random from this population. What is the probability that it is taller than 265 in.? (round to the nearest ten-thousandth)

A)0.9332 B) 0.8350 C)0.1650 D)0.0668 E) NOTA

15. In a random sample of the Autobots, it is measured that their $\bar{x}$ is 240in. Determine how many Autobots were sampled if the probability of having an average this large or larger is 0.9554.

A)1.7 B)2 C)2.89 D)3 E) NOTA

16. An engineer reads a report that states that a sample of eleven steel beams had an average tensile strength of 38.45 MPa with standard deviation 0.13 MPa. Should the t-curve be used to find a confidence interval for the mean tensile strength?

A) Yes, because we know all the measurements needed to calculate the confidence interval.

B) No, because it should be computed with a Z-curve.

C) No, because we are not sure that the measurements came from a normal population.

D) No, because there is insufficient data in order to calculate the confidence interval.

E) NOTA

17. The random variable U has a mean 24 and standard deviation of 3.8. The random variable F has a mean 36 and standard deviation 2.2. Assume both variables are independent and determine the mean and variance in the format (mean, variance) for U-F?

A)(-12, 9.6) B)(-12, 19.28) C)(-6, 9.6) D)(-6, 19.28) E) NOTA

18. If we were to measure the arm sizes from a random, independent sample of 100 University of Florida students, what would the margin of error be if the standard deviation for all UF students is 30 and we would like to be 95% confident? (Round to the hundredth)

A)0.493 B) 0.59 C)4.93 D) 5.88 E) NOTA

19. Assume that the probability that a baseball player will get a hit in any one at-bat is .260. Which expression will yield the probability that his first hit will next occur on his 6th at-bat?

A) $\binom{6}{5}(.260)^5(.740)^1$ B) $(.740)^5(.260)^1$ C) $(.260)^5(.740)^1$

D) $\binom{6}{1}(.260)^1(.740)^5$ E) NOTA

20. If P(A) = .5, P(B) = .3, and P(A and B) = .15, which of the following is true?

A) Events A and B are mutually exclusive but not independent.
B) Events A and B are independent but not mutually exclusive.
C) Events A and B and neither independent nor mutually exclusive.
D) Events A and B are independent and mutually exclusive.
E) Events A and B are independent, but whether A and B are mutually exclusive cannot be determined from the given information.

21. The conditions that np>10 and n(1-p)>10 are imposed on a sampling distribution to protect

against

A) A very small population size.
B) bias in the responses of the sample participants.
C) A sample that is not representative of the population
D) skewness in the distribution.
E) NOTA

Use the following information for questions **22 and 23**:
In an experiment testing the fairness of a coin, Woolf tossed a coin 1000 times and got 509 heads. Use the parameter p to denote the probability that a head occurs.

22. What is the alternative hypotheses?
A) $H_1 : p \neq 0.5$ B) $H_1 : 0.5 < p < 0.509$ C) $H_1 : p \neq 0.509$ D) $H_1 : p < 0.509$ E) NOTA

23. What is the p-value of this experiment? (Round Z score to the hundredth)
A)0.4314 B)0.5686 C)0.7157 D)0.8212 E) NOTA

24. When comparing 2 population means, what assumptions are made?
I. They are both SRS's'; from 2 distinct populations
II. The samples are independent
III. The populations are normally distributed
IV. Population mean is known
V. Population standard deviation is unknown
A)I, II, III B)II, III, V C) I, II,III,IV D) I,II,III,V E) NOTA

25. What is the variance of the following population data set? {0, 10, 20, 30, 50}

A)22 B)296 C)370 D)1480 E) NOTA

26. In Florida, the probability of snow on any given day in December is 5%. Let X be a snowy day in December in Florida. Of the following, which distribution is the best statistical model for X?

A)Binomial B)Geometric C)Poisson D)Gaussian E) NOTA

27. A little lonely man sits on top of a bridge, agonizing over which superhero costume he should wear to the comic book convention. While sitting and contemplating on top of the bridge, he begins eating an unlimited supply of bananas (To boost potassium so that he can grow into his costume). Due to the abundance of bananas, he decides to eat until the first red polka-dotted banana.
Of the following, which distribution is the best statistical model?

A)Binomial B)Geometric C)Poisson D)Gaussian E) NOTA

Use the following information to solve problems **28 and 29**.

In a pet store, it is noted that the length of female guppies is normally distributed with mean 14mm and variance 9, and the length of male guppies is normally distributed with mean 13mm and variance 16. You are told that a particular guppy is 16 mm long.

28. What is the more likely gender of this guppy?

A)Male B)Female C)Equally likely D)Neither E) NOTA

29. If the guppy is a male, what percentage of the other male guppies are larger?

A) 0.2266 B) 0.2546 C) 0.7454 D) 0.7734 E) NOTA

30. A distribution has an interquartile range of 30. Which of the following 5 number summary represents this range?

A) [0, 5, 20, 35, 40]
B) [5, 10, 30, 45, 60]
C) [6, 10, 20, 30, 40]
D) [10, 20, 30, 40, 50]
E) NOTA