PROBABILITY TEST
ALPHA LEVEL
NATIONAL MU ALPHA THETA
MISSISSIPPI 2002

If none of the answers are correct, choose "E" for "NOTA" or "None of the above"

1. A committee consisting of 6 members has to elect a president and a treasurer. In how many ways can they do this?

A: 15 B: 10 C: 30 D: 25

2. A box contains 5 red balls and 7 green ones. Four balls are selected at random without replacement. What is the probability that three of the four selected balls are green?

A: $\frac{3}{35}$ B: $\frac{35}{396}$ C: $\frac{35}{99}$ D: $\frac{5}{7}$

3. A class consists of 10 students who received an A for the final exam, 15 who received a B, and 20 who received a C. Five students are selected at random from this group. What is the probability that at least one of the five students selected received an A for the final exam.

A: 0.6993 B: 0.2675 C: 0.7343 D: 0.4286

4. A box contains 5 white balls, 3 red balls, and 7 green balls. Balls are selected at random one by one without replacement till a green ball is selected. What is the probability at least 5 balls will be selected?

A: $\frac{2}{39}$ B: $\frac{8}{429}$ C: $\frac{13}{60}$ D $\frac{6}{77}$

5. Four married couples are assigned seats at random in a row consisting of eight seats. What is the probability that Mrs. And Mr. Smith end up sitting next to each other?

A: $\frac{1}{28}$ B: $\frac{1}{7}$ C: $\frac{1}{4}$ D: $\frac{1}{8}$

6. A company has bought 20 machines from a manufacturer. The manufacturer advises them that 8 of these machines have a flaw. They take a random sample of 5 machines. What is the probability that exactly 2 of the machines in the sample have a flaw?

A: $\frac{2}{5}$ B: $\frac{385}{969}$ C: $\frac{5}{8}$ D: $\frac{220}{741}$

7. Four girls and four boys are assigned seats at random at a round table. What is the probability that no two persons of the same sex will be sitting next to each other?

A: $\frac{1}{280}$ B: $\frac{1}{560}$ C: $\frac{1}{35}$ D: $\frac{1}{140}$

8. Four cards are dealt at random from a deck of 52 cards. What is the probability that the four cards contain at least one spade?

A: 0.7776 B: 0.6962 C: 0.9951 D: 0.8572

9. A die is rolled six times. What is the probability that none of the six rolls results in a 6?

A: 0.545 B: 0.255 C: 0.435 D: 0.335

10. A box contains 5 white balls, 5 red balls, and 5 green balls. Ten balls are selected at random without replacement. What is the probability that all the red balls are among the 10 selected balls?

A: $\frac{12}{143}$ B: $\frac{1}{3}$ C: $\frac{11}{140}$ D: $\frac{14}{141}$

11. In a class of 30 students 15 are taking French and 20 are taking Spanish. What is the probability that a student who is selected at random from this class is taking both French and Spanish?

A: $\frac{1}{5}$ B: $\frac{1}{6}$ C: $\frac{1}{3}$ D: $\frac{1}{4}$

12. An urn contains 2 white balls, 3 red balls, and 4 green balls. Three balls are selected from this urn without replacement. What is the probability that all three balls will have the same color?

A: $\frac{1}{3}$ B: $\frac{5}{84}$ C: $\frac{1}{21}$ D: $\frac{1}{8}$

13. Five letters are selected at random from the alphabet without replacement. What is the probability of getting two vowels (a, e, i, o, or u) and three consonants?

A: 0.173 B: 0.202 C: 0.231 D: 0.143

14. In a population of 100 students, 20 are seniors, 25 are juniors, and 20 are freshmen. Six of the seniors, 5 of the sophomores, and 3 of the freshman take a second language. It is given that $\frac{7}{9}$ of the upperclassmen (juniors and seniors) don't take a second language. What is the probability that a student picked at random from this group is not a senior and doesn't take a second language?

A: 0.28 B: 0.22 C: 0.72 D: 0.68

15. Consider the following experiment. Each trial consists of either tossing a fair coin or rolling a fair die. You start with tossing the coin. As long as it turns out tails you will keep tossing it. The moment it turns out heads you will stop tossing it and start rolling the die. You continue rolling the die until you get a four or a five, then you start tossing the coin again. You keep applying the rules described above to change from tossing the coin to rolling the die and vice versa. What is the probability that on the third trial you will toss a coin?

A: $\frac{1}{2}$ B: $\frac{5}{12}$ C: $\frac{1}{3}$ D: $\frac{1}{4}$

16. Two identical boxes are taken. The 10 letters, A up to and including J, are placed in one box, the remaining letters are placed in the other box. A box is selected at random and then a letter is taken at random from the selected box. What is the probability that the selected letter will be a vowel?

A: $\frac{17}{80}$ B: $\frac{29}{150}$ C: $\frac{15}{78}$ D: $\frac{21}{144}$

17. Urn A contains two white balls and two black balls; urn B contains three white and two black balls. One ball is randomly transferred from A to B. Then one ball is drawn from B and it turns out to be white. What is the probability that the transferred ball was white.

A: $\frac{4}{7}$ B: $\frac{7}{12}$ C: $\frac{1}{2}$ D: $\frac{2}{3}$

18. In a group of four people each one writes his name on a piece of paper and puts it in a box. Then a name is drawn at random by each without replacement. What is the probability that no one draws his own name?

A: $\frac{1}{2}$ B: $\frac{1}{3}$ C: $\frac{1}{4}$ D: $\frac{3}{8}$

19. Four machines are in operation. Machine A produces 5 percent defective items, machine B produces 3 percent defective items, machine C produces 4 percent defective items, and machine D produces 8 percent defective items. An item is picked at random from the four machines. Given that the item picked is defective, find the probability that it came from machine B.

A: 0.03 B 0.15 C: 0.25 D: 0.10

20. The letters of STUDENT are arranged at random. What is the probability that the U will appear in some position after the E?

A: $\frac{1}{2}$ B: $\frac{63}{125}$ C: $\frac{52}{201}$ D: $\frac{48}{97}$

21. A student is taking a multiple-choice test consisting of 20 problems. For each problem 4 options are given of which only one is correct. To pass the test the student should have at least 11 correct answers. The student hasn't studied and selects his answers at random. What is the probability that he will pass the test?

A: 0.001 B: 0.004 C: 0.999 D: 0.715

22. A box contains 6 red balls and 5 green balls. Three balls are selected at random from this box with replacement. What is the probability that exactly two of the three balls are green?

A: 0.364 B: 0.113 C: 0.338 D: 0.226

23. The letters of CONSPICUOUS are arranged randomly. What is the probability that P will appear in the position directly in front of I?

A: $\frac{1}{11}$ B: $\frac{1}{121}$ C: $\frac{1}{10}$ D: $\frac{1}{13}$

24. A die is being rolled until three sixes are obtained. What is the probability that the third six will occur at the 18^{th} roll of the die?

A: 0.167 B: 0.053 C: 0.041 D: 0.134

25. Two random numbers between 0 and 5 inclusive are chosen. What is the probability that their sum is less than 3?

A: 0.2 B: 0.333 C: 0.6 D: 0.18

26. A square dartboard measuring 18 inches by 18 inches has in its center three concentric circles of radii 3, 4, and 5 inches. Suppose that a dart, which is equally likely to hit at any point on the board, is thrown and that it hits the dartboard. What is the probability that it hits within the bullseye (inside the circle of radius 3 inches)?

A: $\frac{\pi}{36}$ B: $\frac{\pi}{2}$ C: $\frac{\pi}{18}$ D: $\frac{\pi}{54}$

27. A subcommittee of four is to be chosen from a group of 15 Republicans and 24 Democrats. What is the probability that the subcommittee contains an odd number of Republicans?

A: 0.502 B: 0.369 C: 0.005 D: 0.051

28. In order, Anna, Beth, and Carrie take turns flipping the same fair coin. The first one to toss a head wins. What is the probability that Beth wins?

A: $\frac{1}{4}$ B: $\frac{1}{2}$ C: $\frac{1}{3}$ D: $\frac{2}{7}$

29. How many people would have to be randomly selected for the probability to be greater than 50% that at least one had a birthday on February 29?

A: 254 B: 1013 C: 366 D: 730

30. Two 6-sided dice are rolled. What is the probability the total is prime?

A: $\frac{5}{11}$ B: $\frac{1}{3}$ C: $\frac{13}{36}$ D: $\frac{5}{12}$

ANSWER KEY TO ALPHA PROBABILITY TEST

1. C
2. C
3. C
4. A
5. C
6. B
7. C
8. B
9. D
10. A
11. B
12. B
13. B
14. D
15. B
16. A
17. A
18. D
19. B
20. A
21. B
22. C
23. A
24. C
25. D
26. A
27. A
28. D
29. B
30. D