For all questions, answer E. "NOTA" means none of the above answers is correct.
Calculator use – NO calculators will be permitted on any test other than the Statistics topic test.
The word "deck" refers to a standard 52 card deck that is well shuffled.

1 Evaluate ${}_7P_4$

A. 24 B. 35 C. 120
D. 840 E. NOTA

2 A fair coin is flipped 8 times. What is the probability of getting more heads than tails?

A. $\frac{1}{2}$ B. $\frac{53}{100}$ C. $\frac{23}{64}$
D. $\frac{93}{256}$ E. NOTA

3 A card is drawn from a standard deck and a die is tossed. What is the probability of obtaining at least one 3?

A. $\frac{3}{13}$ B. $\frac{4}{13}$ C. $\frac{10}{13}$
D. $\frac{12}{39}$ E. NOTA

4 Two identical bowls contain gumdrops. The first box contains 7 cherry and 5 orange gumdrops. The second bowl contains 8 cherry gumdrops and 7 grape gumdrops. The probability that a gumdrop chosen at random from a randomly selected bowl is cherry is $\frac{a}{b}$, where a>0, b>0 and GCD(a,b)= 1.

Find $a+b$.

A. 14 B. 63 C. 187
D. 1122 E. NOTA

5 If two numbers between 0 and 2 (inclusive) are chosen at random what is the probability that the sum of their squares exceeds 2?

A. $\frac{8-\pi}{8}$ B. $\frac{1}{8}$ C. $\frac{\pi}{2}$
D. $\frac{1}{2}$ E. NOTA

6 In two-person Gin Rummy, the dealer deals each player ten cards, face down, one at a time. After the 20 cards are dealt what is the probability that the next card will be a King?

A. $\frac{1}{42}$ B. $\frac{2}{21}$ C. $\frac{1}{13}$
D. can't be determined E. NOTA

7 How many 3-digit numbers have exactly one zero?

A. 81 B. 100 C. 162
D. 648 E. NOTA

8 If P(A) = $\frac{7}{10}$ and P(B|A) = $\frac{4}{7}$, Find the $P(A \cap B)$

A. $\frac{2}{5}$ B. $\frac{40}{49}$ C. $\frac{9}{70}$
D. $\frac{61}{70}$ E. NOTA

9 What is the probability of getting a total of 9 when three dice are thrown?

A. $\frac{1}{9}$ B. $\frac{5}{36}$ C. $\frac{25}{216}$
D. $\frac{13}{108}$ E. NOTA

10 Let N be the sum of the elements in the 30 row of Pascal's Triangle. What is N (mod 100)?

A. 21 B. 22 C. 25
D. 26 E. NOTA

The following description should be used for problems 11- 13.
Roy has a large number of colored blocks. The blocks come in the following colors: Red, Orange, Yellow, Green, Blue, Indigo and Violet. Roy creates every possible 4-block rearrangement of distinct colors, sorts them by alphabetizing them by color name and then spreads them out on a long table.

11 The first rearrangement is BGIO. Roy's favorite number is 211. Which rearrangement is in position 211?

A. GIBY B. GOBR C. GRIV
D. GVOR E. NOTA

12 Roy's favorite colors are Green, Blue, Indigo and Violet. How many of the rearrangements contain all four of those colors?

A. 24 B. 35 C. 120
D. 840 E. NOTA

13 Roy decided to separate all the rearrangements into sets with the following property: Each set would contain only rearrangements with the same set of four colors. How many different sets would he have?

A. 24 B. 35 C. 256
D. 840 E. NOTA

14 The list 2,3,5,6,7,9,10,… contains every positive integer that is not a perfect square or a perfect cube. What is the 400^{th} element of this list.

A. 424 B. 425 C. 426
D. 427 E. NOTA

15 How many distinguishable arrangements are there for the letters in "BESTSELLER"?

A. $10!$ B. $\frac{10!}{3!}$ C. $\frac{10!}{3!4!}$

D. $\frac{10!}{4!}$ E. NOTA

16 Chuck-a-Luck is a game often played at carnivals. A player bets \$1 on any one of the numbers 1,2,3,4,5 or 6. Three dice are rolled. If the player's number appears on one, two or three dice, he receives \$1, \$2 or \$3 respectively, plus his \$1 bet back, otherwise he loses his dollar. To the nearest penny, what is his expected return on each play?

A. \$1.08 B. \$0.99 C. \$0.92

D. \$0.89 E. NOTA

17 Chuck-a-Luck is a very popular game. For a game to be successful there must be elements of the game that appeal to either the player and/or the person operating the game. Select the pair of terms that best describes the attraction of the Player and then the Operator.

A. Variability-Expected Value B. Expected Value-Variability C. Skew-Expected Value

D. Mean-Skew E. NOTA

18 In a class, 14 people like Avocados, 20 people like Bananas, 13 people like Cucumbers. 8 people like Avocados and Bananas, 10 people like Bananas and Cucumbers while only 5 people like Avocados and Cucumbers. The probability that a person likes Apples, Bananas and Cucumbers is $\frac{1}{7}$. If n is the number of people in the class, what is the sum of the digits of n?

A. 10 B. 8 C. 6

D. 4 E. NOTA

19 If set S = {1,2,4,8,16} how many subsets does S have?

A. 5 B. 10 C. 120

D. 32 E. NOTA

20 Joe, Bob and Saul are playing a game where they roll two dice until someone gets a 7. If the players roll in the order above and take turns, what is the probability that Saul wins?

A. $\frac{1}{3}$ B. $\frac{10}{33}$ C. $\frac{71}{216}$

D. $\frac{25}{91}$ E. NOTA

21 In how many ways can 15 be written as the sum of five non-negative integers? (Assuming order matters)

A. ${}_{15}C_5$ B. ${}_{15}C_4$ C. ${}_{19}C_4$

D. ${}_{19}C_5$ E. NOTA

22 Solve for *n* such that ${}_nC_4 = 5\left({}_nC_5\right)$

A. 3 B. 5 C. 6
D. 10 E. NOTA

23 Joyce and Jill are playing tennis. If the odds of Joyce winning are 3 to 8, what is the probability that Jill will win?

A. $\frac{3}{8}$ B. $\frac{8}{11}$ C. $\frac{3}{11}$
D. $\frac{5}{8}$ E. NOTA

24 Suppose you're on a game show and you're given the choice of three doors. Behind one door is a car; behind the others, goats. The car and the goats were placed randomly behind the doors before the show. The rules of the game show are as follows: After you have chosen a door, the door remains closed for the time being. The game show host, who knows what is behind the doors, now has to open one of the two remaining doors, and the door he opens must have a goat behind it. If both remaining doors have goats behind them, he chooses one randomly. After the host opens a door with a goat, he will ask you to decide whether you want to stay with your first choice or to switch to the last remaining door. You have two choices: 1. Stay with the door you originally chose. 2. Switch to the other door.
What are the probabilities for Choice 1 and Choice 2?

A. Stay = $\frac{1}{3}$ Switch= $\frac{1}{3}$ B. Stay = $\frac{1}{2}$ Switch= $\frac{1}{2}$ C. Stay = $\frac{1}{3}$ Switch = $\frac{2}{3}$
D. Can not be determined E. NOTA

25 What is the fourth coefficient of the expansion $\left(8y-3x\right)^{-\frac{1}{3}}$

A. $\frac{7}{1536}$ B. $-\frac{14}{81}$ C. $-\frac{5}{81}$
D. $\frac{7}{41472}$ E. NOTA

26 How many committees consisting of 3 Democrats and 5 Republicans can be chosen from a group of candidates which includes 8 Democrats and 8 Republicans?

A. 112 B. 3136 C. 7056
D. 12870 E. NOTA

27 I have 5 unique keys. If A = the number of ways I can arrange them in a line, B=the number of ways I can arrange them in a circle and C= the number of distinguishable ways I can arrange them on a key ring, what is $\frac{A}{B}+\frac{B}{C}$?

A. 1 B. $\frac{11}{2}$ C. 7
D. 258 E. NOTA

28 You and a friend agree to meet at your favorite fast-food restaurant between 5:00 and 6:00 P.M. Assume that each of your arrival times is random within that hour. The one who arrives first will wait 15 minutes for the other, after which the first person will leave. What is the probability that the two of you will actually meet?

A. $\frac{1}{4}$ B. $\frac{7}{16}$ C. $\frac{9}{16}$

D. $\frac{1}{2}$ E. NOTA

29 Consider the following events:
E1 = students on the swimming team
E2 = students on the debate team
E3 = students on the water polo team
E4 = rolling a die
E5 = drawing a card from a standard 52 card deck
E6 = spinning a spinner with 6 choices {1,2,3,4,5,6}
Which of the following pairs of events is both Mutually Exclusive AND Independent

A. E1 and E2 B. E1 and E3 C. E4 and E5

D. E4 and E6 E. NOTA

30 After a traumatic blow, Alex's kidneys have failed so he can not survive unaided. Only about 52% of patients survive for 3 years with kidney dialysis. Transplant operations usually succeed. After 1 month, 96% of the transplanted kidneys are functioning. Three percent fail to function, and the patient must return to dialysis. The remaining 1% of patients die within a month. Patients who return to dialysis have the same chance (52%) of surviving 3 years as if they hadn't attempted a transplant. Of the successful transplants, however, only 82% continue to function for 3 years. Another 8% of these patients must return to dialysis, and 70% of these survive to the 3-year mark. The remaining 10% of "successful" patients die without returning to dialysis. Which of the following best represent Alex's 3-year survival rate?

A $(.96)(.82)+(.96)(.08)(.70)+(.03)(.52)$ B, $(.96)(.82)+(.08)(.70)+(.03)(.52)$

C. $(.96)(.82)+(.96)(.08)(.70)+(.03)(.48)$ D. $(.52)(.82)+(.96)(.08)(.70)+(.03)(.52)$

E. NOTA

Answers

1.	D	840	16.	C	
2.	D		17.	A	
3.	A		18.	A	
4.	C		19.	D	
5.	A		20.	D	
6.	C		21.	C	
7.	C		22.	B	
8.	A		23.	B	
9.	C		24.	C	
10.	E	must be divisible by 4	25.	A	
11.	D		26.	B	
12.	A		27.	C	
13.	B		28.	B	
14.	B	425	29.	E	
15.	E	$\frac{10!}{3!2!2!}$ $2!2! \neq 4!$	30.	A	

A	8
B	6
C	8
D	5
E	3
	30