

1. An automotive part can be defective in one of two ways: inferior steel or sloppy assembly. A quality control check shows that 7% of production has poor steel but acceptable assembly, 6% has improper assembly with acceptable steel, and 2% of production has both types of defect. How much of the production has neither type of defect?

- a. 85%                      b. 87%                      c. 83%                      d. 93%                      e. 89%

2. Four out of 10 employees are to be sent to a different plant to train the workers there in the use of a new manufacturing method. Five of the 10 are males. What is the probability that a random “gender blind” selection procedure will result in the choice of 2 males and 2 females?

- a. 0.5                      b. 0.476                      c. 0.524                      d.  $6(0.5)^4$                       e. 0.438

3. A corporation has 3 contracts to be assigned to one or more of 4 firms bidding for them. Each firm can receive zero, one, two or all three contracts. If all outcomes are equally likely, what is the probability that all three contracts go to a single firm, firm “A”?

- a.  $\frac{1}{64}$                       b.  $\frac{4}{27}$                       c.  $\frac{1}{27}$                       d.  $\frac{3}{64}$                       e.  $\frac{1}{32}$

4. Let A and B be independent events. If  $P(A) = .6$  and  $P(B) = .5$ , what is  $P(A \cup B)$ ?

- a. 1.1      b. 0.8                  c. 0.9                  d. 0.7                  e. 1

5. A pair of dice is rolled? If at least one of the dice shows a “3” on its top face, what is the probability that the sum is 7?

- a.  $\frac{1}{6}$       b.  $\frac{2}{11}$                   c.  $\frac{2}{9}$                   d.  $\frac{7}{36}$                   e.  $\frac{5}{36}$

In problems 6 through 9, put an X on answer b if the statement is always true and on answer d if it is sometimes false.

6.  $P(A \cup B) = 1 - P(\overline{A} \cup \overline{B})$

7.  $P(AB) + P(A \cup B) = P(A) + P(B)$

8.  $P(A \cup B) \leq P(A) + P(B) - 1$

9. If  $AB = AC = BC = \emptyset$ , then  $P(A \cup B \cup C) = P(A) + P(B) + P(C)$

10. A small town has an adult population of 3000. Of the 1600 women in the town, 200 are smokers. The number of men who smoke is 130.

What is the probability that a citizen of the town is a smoker?

- a. 0.15      b. 0.13      c. 0.11      d. 0.09      e. 0.07

11. In problem 10, if a citizen is a smoker, what is the probability that the citizen is a male?

- a. 0.394      b. 0.427      c. 0.481      d. 0.331      e. 0.521

12. The integers from 0 to 9999 can be viewed as four digit numbers, e.g., 0 is 0000, 237 is 0237, 64 is 0064, etc.

For such an integer, what is the probability that the first digit does not equal the last, and the second does not equal the third?

- a. 0.85      b. 0.9      c. 0.72      d. 0.81      e. 0.98

13. A discrete random variable assumes the values 2, 3, 4, 5, and 6 with probabilities 0.1, 0.1, 0.3, 0.3, and 0.2, respectively. Find the variance  $V(X)$ .

- a. 1.44      b. 1.2      c. 3.72      d. 2.84      e. 0.68

14. For the discrete random variable  $X$  we have  $E(X) = 2$  and  $E(X^2) = 6$ . Find the variance of  $Y$  where  $Y = 3X + 2$ .

- a. 24      b. 8      c. 20      d. 6      e. 18

15. The daily production of TV monitors at a factory averages 1200 monitors with a standard deviation of 100. Find the shortest interval (centered at 1200) certain to contain at least 90% of the daily production level. (Round off your final answers to the nearest integers.)

- a. (820, 1580)      b. (932, 1468)      c. (800, 1600)  
d. (900, 1500)      e. (884, 1516)

16. In the preceding problem, how likely is it that the production will exceed 1500 units a day?

- a. Less than 11%    b. Less than 20%    c. Less than 8%    d. Less than 15%    e. Less than 5%

17. An item is manufactured so that only 1% of the output is defective. What is the probability that, in a run of 100 items, there is exactly one defective?

- a.  $(0.99)^{99}$     b. 0.50    c.  $.01(0.99)^{99}$   
d.  $100(.01)^{99}(0.99)$     e. 0.672

18. In problem 17, let  $X$  denote the number of defectives when 100 items are manufactured. What is  $V(X)$ ?

- a. 0.992    b. 0.99    c. 0.99    d. 9.92    e. 9.95