

1. What truth values of p , q and r make the statement $\sim p \wedge (\sim q \vee r)$ true?
- a) $p = T, q = T, r = F$
 - b) $p = F, q = T, r = T$
 - c) $p = F, q = T, r = F$
 - d) $p = T, q = F, r = F$
2. Which of the following statements is equivalent to $\sim(\sim p \vee q)$?
- a) $p \wedge \sim q$
 - b) $\sim p \wedge \sim q$
 - c) $p \vee \sim q$
 - d) $\sim p \vee \sim q$
3. Which of the following is the negation of the statement "If I can't play, then I will go home"?
- a) If I can play, then I won't go home.
 - b) I can play and I will not go home.
 - c) I can't play or I will not go home.
 - d) I can't play and I will not go home.
4. Which of the following is equivalent to $p \rightarrow q$?
- a) $q \rightarrow p$
 - b) $\sim p \rightarrow \sim q$
 - c) $\sim q \rightarrow \sim p$
 - d) $\sim p \rightarrow \sim q$
5. Decide whether the following argument is valid or invalid.
- | | |
|--|--------|
| It will be hot or it will rain tomorrow. | |
| It will not rain tomorrow. | |
| It will be hot tomorrow. | 2
3 |
- a) Valid
 - b) Invalid
 - c) Neither
 - d) Cannot be determined
6. Decide whether the following argument is valid or invalid.
- | | |
|----------------------------|---------|
| All snowy days are cloudy. | |
| Today is not cloudy. | 36 |
| Today is not snowy. | 5
18 |
- a) Valid
 - b) Invalid
 - c) Neither
 - d) Cannot be determined
7. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{1, 2, 3, 5, 7, 9\}$, $B = \{2, 3, 5, 7\}$, and $C = \{2, 4, 6, 8\}$. Find $(A \cap C) \cap B'$.
- a) $\{0\}$
 - b) $\{2\}$
 - c) U
 - d) \emptyset
8. A single fair die is rolled. What is the probability of rolling a number less than 3?
- a) $\frac{1}{2}$
 - b) $\frac{1}{3}$
 - c) $\frac{1}{6}$
 - d) $\frac{5}{6}$
9. One card is drawn from a standard deck of 52 cards. What is the probability that it is a Jack or a Heart?
- a) $\frac{17}{52}$
 - b) $\frac{1}{2}$
 - c) $\frac{1}{52}$
 - d) $\frac{4}{13}$
10. Suppose A and B are mutually exclusive events with $P(A) = \frac{1}{3}$ and $P(B) = \frac{2}{3}$. Find $P(A \cap B)$.
- a) $\frac{1}{3}$
 - b) $\frac{1}{3}$
 - c) 0
 - d) 0
11. Two fair dice are rolled. What is the probability that their sum is 8 or 10 given that both dice are even.
- a) $\frac{5}{18}$
 - b) $\frac{5}{9}$
 - c) $\frac{1}{6}$
 - d) $\frac{1}{6}$

12. A menu offers a choice of 2 appetizers, 5 main dishes, and 3 desserts. If a meal consists of one appetizer, one main dish, and one dessert, how many different meals are possible?
17. If a coin is flipped 4 times, what is the expected value for the number of heads?

- a) 10
- b) 20
- c) 30
- d) 40

- a) 1
- b) 1.5
- c) 2
- d) 2.5

13. Suppose a four-letter password must consist of only the letters A,B,C,D,E, with no repeated letters. How many different passwords are possible?
18. Find the expected value of x , given the following probability distribution:

x	0	1	2	3
$P(x)$	0.5	0.2	0.1	0.2

- a) 60
- b) 120
- c) 280
- d) 360

- a) 1
- b) 1.4
- c) 2
- d) 2.5

14. Evaluate $P(6, 3)$.

- a) 120
- b) 60
- c) 30
- d) 20

19. If one card is drawn at random from a deck, what is the expected value of the number of aces drawn?

- a) $\frac{1}{4}$
- b) $\frac{1}{52}$
- c) $\frac{1}{13}$
- d) 1

15. How many distinguishable permutations of the letters in the word SUCCESSES are possible?

- a) $9!$
- b) $\frac{9!}{8!}$
- c) $\frac{9!}{2!4!}$
- d) $\frac{9!}{4!2!2!}$

20. For $n > 0$, $\binom{n}{0}$ is equal to

- a) 0
- b) 1
- c) $n!$
- d) Can't be decided.

16. A box contains 4 red marbles, 3 black marbles, and 2 white marbles. A marble is drawn from the box, replaced, then another is drawn. If the random variable x denotes the total number of black marbles drawn, find the value y in the probability distribution below:
21. $\binom{4}{0} + \binom{4}{1} + \binom{4}{2} + \binom{4}{3} + \binom{4}{4}$ is equal to

x	0	1	2
$P(x)$			y

- a) $\frac{4}{9}$
- b) $\frac{1}{9}$
- c) $\frac{1}{3}$
- d) $\frac{2}{3}$

- a) $4!$
- b) 12
- c) 16
- d) 20

22. A club consists of 3 men and 4 women. In how many ways can a 3-member committee be selected so that it contains at least 1 woman?
- a) 31
b) 32
c) 33
d) 34
23. A coin is tossed four times. What is the probability that at most one of them shows heads?
- a) $\frac{1}{4}$
b) $\frac{5}{16}$
c) $\frac{5}{8}$
d) $\frac{1}{16}$
24. A die is rolled 4 times. What the probability that exactly 3 sixes are rolled?
- a) $\binom{4}{3} \cdot \frac{1}{6^3} \cdot \frac{5}{6}$
b) $\binom{4}{3} \cdot \frac{1}{6^4}$
c) $\binom{4}{3} \cdot \frac{1}{6} \cdot \left(\frac{5}{6}\right)^3$
d) $\binom{4}{3} \cdot \left(\frac{5}{6}\right)^4$
25. Which of the following is **TRUE**?
- a) $\binom{10}{4} = \binom{9}{4} + \binom{9}{3}$
b) $P(10, 4) = P(10, 6)$
c) $P(10, 4) = P(9, 4) + P(9, 3)$
d) $P(10, 0) = 0$
26. Suppose that a family has 5 children, and the probability of having a girl is 50%. What is the probability that the family has exactly 2 girls and 3 boys?
- a) $\frac{3}{16}$
b) $\frac{5}{16}$
c) $\frac{7}{16}$
d) $\frac{9}{16}$
27. A basket contains 6 apples, 2 of which are rotten. What is the probability that in a sample of 3 apples picked from the basket, none are rotten?
- a) $\frac{1}{5}$
b) $\frac{2}{5}$
c) $\frac{3}{5}$
d) $\frac{4}{5}$
28. Three cards are drawn at random from a standard deck of 52 cards. What is the probability that all 3 are of the same suit?
- a) $\frac{\binom{4}{3}\binom{13}{1}}{\binom{52}{3}}$
b) $1 - \frac{\binom{4}{3}\binom{13}{1}}{\binom{52}{3}}$
c) $\frac{\binom{4}{1}\binom{13}{3}}{\binom{52}{3}}$
d) $1 - \frac{\binom{4}{1}\binom{13}{3}}{\binom{52}{3}}$
29. There are 3 red and 4 blue marbles in a jar. If 3 marbles are drawn, what is the probability that at least 1 is red?
- a) $\frac{34}{35}$
b) $\frac{31}{35}$
c) $\frac{4}{35}$
d) $\frac{1}{35}$
30. A drawer contains 4 black socks and 2 white socks. If two socks are chosen at random from the drawer, what is the probability that they will match?
- a) $\frac{2}{5}$
b) $\frac{3}{5}$
c) $\frac{7}{15}$
d) $\frac{3}{4}$

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