

STAT 213: PROBABILITY AND DECISION THEORY
Common Core Final Exam Practice Problems

1. Find the slope of the line that passes through the points $(-4, 3)$ and $(-4, 0)$.
a. $-3/8$ b. undefined c. 0 d. $8/3$
ANS: b

2. Find an equation of the line that passes through the point $(-3, 0)$ and is perpendicular to the line $y = 5x + 7$.
a. $y = -\frac{x}{5} + \frac{3}{5}$ b. $y = \frac{x}{5} + \frac{3}{5}$ c. $y = -\frac{x}{5} - \frac{3}{5}$ d. $y = -5x + 15$
ANS: c

3. Let f be the function defined by $f(x) = 2x - 10$. Find $f(-1)$.
a. 12 b. -12 c. 8 d. -13
ANS: b

4. The Home-helper Company sells hummingbird feeders for \$6 per unit. Fixed costs are \$37,500 and the variable costs are \$2 per unit. How many feeders must be sold to realize a profit of 15% of sales?
a. 9,375 b. 9,740 c. 11,209 d. 12,097
ANS: d

5. Find the point of intersection of the given pair of straight lines: $\begin{cases} x + y = 15 \\ x - y = -1 \end{cases}$
a. $(7, 8)$ b. $(-7, -8)$ c. $(-7, 8)$ d. $(8, 7)$
ANS: a

6. The supply and demand functions for a new product are given by $x - 5p = 15$ and $x + 15p = 55$, respectively, where p is measured in dollars. Find the equilibrium price.
a. \$3.00 b. \$4.00 c. \$2.00 d. \$2.50
ANS: c

7. Given the system of linear equations $\begin{cases} y = 2x + 5 \\ -2x + y = 7 \end{cases}$, which one of the following statements is true?
a. The system has no solution.
b. The system has one and only one solution $(-1, 3)$.
c. The system has infinitely many solutions.
d. The system has one and only one solution $(7, 7)$.
ANS: a

8. Determine the value of k for which the system of linear equations $\begin{cases} 4x + 5y = 12 \\ 8x + ky = 13 \end{cases}$ has no solution.
a. 2 b. 10 c. 5 d. 15
ANS: b

9. Solve the system of linear equations $\begin{cases} x + y - z = -1 \\ 4x - 3y + 2z = 16 \\ 2x - 2y - 3z = 5 \end{cases}$ using Gauss-Jordan

elimination method.

- a. (2, 2, 1) b. (2, -2, 1) c. (2, 3, 0) d. (1, 1, 1)

ANS: b

10. Solve the system of linear equations $\begin{cases} x - 2y - z = 8 \\ 2x - 3y + z = 23 \\ 4x - 5y + 5z = 53 \end{cases}$ using Gauss-Jordan

elimination method.

- a. The system has infinitely many solutions $(-5t+22, -3t+7, t)$.
 b. The system has no solution.
 c. The system has one and only one solution $(22, 7, 0)$.
 d. None of the above

ANS: a

11. Given $\begin{bmatrix} x+2 & 0 & 3 \\ -3 & -2 & y \\ 0 & 8 & z \end{bmatrix} = \begin{bmatrix} 5 & 0 & x \\ -3 & 1-x & 12 \\ 0 & 8 & 4 \end{bmatrix}$, find (x, y, z) .

- a. (4, 3, 12) b. (1, 3, 7) c. (3, 12, 4) d. None of the above

ANS: c

12. Given $A = \begin{bmatrix} 2 & 1 \\ 0 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -3 & 1 \\ 1 & 2 \end{bmatrix}$, find AB .

- a. $\begin{bmatrix} -5 & 4 \\ 4 & 8 \end{bmatrix}$ b. $\begin{bmatrix} 7 & 4 \\ 4 & 8 \end{bmatrix}$ c. $\begin{bmatrix} -5 & 4 \\ 4 & 9 \end{bmatrix}$ d. $\begin{bmatrix} -5 & 0 \\ 4 & 8 \end{bmatrix}$

ANS: a

13. Find the inverse of the matrix $\begin{bmatrix} 1 & 0 & 2 \\ -1 & 2 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, if it exists.

- a. $\begin{bmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ 1 & -1 & 2 \end{bmatrix}$ b. $\begin{bmatrix} 3 & -2 & 4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{bmatrix}$ c. $\begin{bmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{bmatrix}$ d. $\begin{bmatrix} 3 & -2 & -4 \\ 3 & -2 & 5 \\ -1 & 1 & 2 \end{bmatrix}$

ANS: c

14. Determine which one of the following points is NOT a solution for the system of linear inequalities: $\begin{cases} x + y \leq 2 \\ 2x > 5 \end{cases}$.

- a. (4, -3) b. (5, -2) c. (3, -5/2) d. (3, -1)

ANS: b

15. Solve the following linear programming problem:

$$\begin{aligned} \text{Maximize } P &= 6x + 5y \\ \text{Subject to } 5x + 6y &\leq 420 \\ x &\leq 60 \\ y &\leq 45 \\ x \geq 0; y &\geq 0 \end{aligned}$$

- a. 560 b. 405 c. 460 d. None of the above

ANS: c

16. For a given standard maximization problem, the following final simplex tableau is obtained:

x	y	z	u	v	P	Constant
1	0	-3	5	-1	0	8
0	1	2	8	2	0	2
0	0	3	4	5	1	35

Determine the solution to the standard maximization problem.

- a. $P = 1$ at $x = 8, y = 2, z = 0$. b. $P = 1$ at $x = 0, y = 0, z = 3$.
 c. $P = 35$ at $x = 8, y = 2, z = 0$. d. $P = 35$ at $x = 0, y = 0, z = 3$.

ANS: c

17. You are given the final simplex tableau for the dual problem. Give the solution to the primal problem and to the associated dual problem:

$$\begin{aligned} \text{Problem Minimize } C &= 3x + 7y \\ \text{Subject to } 4x + y &\geq 8 \\ 5x + 2y &\geq 1 \\ x \geq 0, y &\geq 0 \end{aligned}$$

Final tableau

u	v	x	y	P	Constant
1	5/4	1/4	0	0	3/4
0	3/4	-1/4	1	0	25/4
0	9	2	0	1	6

- a. $P = 1$ at $x = 2, y = 0$. b. $C = 6$ at $x = 2, y = 0$.
 c. $P = 1$ at $x = 0, y = 25/4$. d. $C = 6$ at $x = 0, y = 25/4$.

ANS: b

18. Find the accumulated amount after 4 years if \$2,000 is invested at 8% per year compounded monthly.

- a. \$2737.14 b. \$2745.57 c. \$2754.26 d. \$2751.33

ANS: d

19. Find the effective rate of interest corresponding to the nominal rate of 10% per year compounded semiannually.

- a. 10.25% b. 10.47% c. 10.00% d. 10.38%

ANS: a

29. A standard poker hand consists of five cards dealt from a desk of 52. How many different poker hands are possible?
 a. 2,598,960 b. 311,875,200 c. 103,958,400 d. 12,994,800

ANS: a

30. Let $U = \{0, 1, 3, 5, 6, 7\}$ be the sample space of an experiment and let $A = \{0, 3, 5, 7\}$, $B = \{0, 3, 5, 6, 7\}$, and $C = \{0, 5, 6\}$ be events of this experiment, Find the event $A^c \cap B^c \cap C^c$.
 a. $\{0\}$ b. $\{6\}$ c. $\{1\}$ d. $\{\}$

ANS: c

31. A cloth bag contains 70 equally sized marbles: 20 are red, 26 are blue, and 24 are yellow. A marble is randomly selected. Find the probability a marble is selected which is not blue.
 a. $6/7$ b. $2/7$ c. $5/7$ d. $22/35$

ANS: d

32. A card is drawn from a well-shuffled deck of 52 playing cards. What is the probability that it is an ace or a heart?
 a. $1/2$ b. $2/13$ c. $4/13$ d. $1/13$

ANS: c

33. Let A and B be two events of an experiment with sample space S. Suppose $P(A) = 0.2$, $P(B) = 0.1$, and $P(A \cap B) = 0.05$. Compute $P(A^c \cap B)$.
 a. 0.05 b. 0.10 c. 0.15 d. 0.20

ANS: a

34. An unbiased coin is tossed six times. What is the probability that the coin will land tails on the first and the last toss?
 a. $1/8$ b. $1/2$ c. $1/4$ d. $1/32$

ANS: c

35. A pair of dice is tossed. What is the probability that the sum on the two dice is 12, given that doubles are rolled?
 a. 0.20 b. 0.17 c. 0.25 d. 0.15

ANS: b

36. The probability distribution of the random variable X is shown in the accompanying table

x	-5	-4	0	1	2	4
$P(X = x)$	0.1	0.2	0.3	0.1	0.1	0.2

Find $P(X > 2)$.

- a. 0.8 b. 0.2 c. 0.7 d. 0.6

ANS: b

37. The following table gives the probability distribution for the random variable X , where X is the number of defective DVDs found in a randomly selected batch of DVDs produced by a certain manufacturer.

x	0	1	2	3	4
$P(X = x)$	0.502	0.365	0.098	0.033	0.002

Find the expected value $E(X)$.

- a. 0.196 b. 0.099 c. 0.668 d. 0.004

ANS: c

38. Find the odds against winning a bet on red in American roulette. (Hint: the probability of winning is $18/38$).

- a. 9 to 10 b. 10 to 38 c. 10 to 9 d. 10 to 8

ANS: c

39. The probability distribution of a random variable X is shown in the accompanying table

X	0	1	2	3
$P(X = x)$	0.512	0.301	0.132	0.055

Find the standard deviation $\sigma(X)$.

- a. 0.79 b. 0.81 c. 0.89 d. 1.21

ANS: c

40. Find $C(n, x)p^xq^{n-x}$ for the given values $n = 6$, $x = 5$, and $p = 0.99$.

- a. 0.102 b. 0.057 c. 0.075 d. 0.081

ANS: b

41. An article in a certain newspaper states that “Internal surveys paid for by directory assistance providers show that even the most accurate companies give out wrong numbers 15% of the time.” Assume that you are testing such a provider by making 10 requests and also assume that the provider gives the wrong telephone number 15% of the time. Find the probability of getting one wrong number.

- a. 0.263 b. 0.347 c. 0.294 d. 0.712

ANS: b

42. Find $P(-1.18 < Z < 2.15)$.

- a. 0.1359 b. 0.8641 c. 0.8652 d. 0.1347

ANS: c

43. Suppose X is a normal random variable with $\mu = 100$ and standard deviation $\sigma = 15$. Find $P(X > 131.5)$.

- a. 0.0179 b. 0.0156 c. 0.9821 d. 0.8476

ANS: a

44. Replacement times for CD players are normally distributed with a mean of 8.2 years and a standard deviation of 1.4 years. Find the probability that a randomly selected CD player will have a replacement time that is less than 8 years.

- a. 0.1429 b. 0.4443 c. 0.5557 d. -0.1429

ANS: b