

Math 136.101 Midterm A

Instructions:

1. Answer all questions on the machine-scored answer sheet provided. Use pencil only.
2. Return examination paper with machine-scored answer sheet.
3. Single-line display calculators permitted. No other aids permitted.
4. Fill in the information requested below.
5. The examination invigilators may not interpret or explain questions to you.
6. Fill in your student number on the machine-scored sheet and encode it as well.

FAMILY NAME _____ FIRST NAME _____

STUDENT NUMBER _____

SIGNATURE _____

INSTRUCTOR _____

1. What is/are the solutions of the equation $3(x - 2) + 4(2 - x) = x + 5$?
(a) $x = -3/2$ (b) $x = -1$ (c) $x = 3/5$ (d) All real numbers (e) None of these
2. What is/are the solutions of the equation $2(1 - 3x) - 4(x + 5) = 5(3 - 2x) - 33$?
(a) $x = 2$ (b) $x = -3/2$ (c) $x = 4/3$ (d) All real numbers (e) None of these
3. Which of the following inequalities is equivalent to $4 - 3x \leq 2$?
(a) $x \leq 2/3$ (b) $x \leq -2/3$ (c) $x \geq 2/3$ (d) $x \geq -2/3$ (e) $x \leq 1$
4. Which of the following inequalities is equivalent to $2(x - 1) + 3(x - 4) \geq x + 5$?
(a) $x \leq 4/19$ (b) $x \geq -19/4$ (c) $x \geq 4/19$ (d) $x \leq 19/4$ (e) None of these
5. What is the x -coordinate of the point on the line $3x + 4y = 15$ whose y -coordinate is -4 ?
(a) $27/4$ (b) $31/3$ (c) $3/4$ (d) $-1/3$ (e) None of these
6. What is the x -intercept of the line $3x - 4y + 7 = 0$?
(a) $(3, 0)$ (b) $(3/4, 0)$ (c) $(-7/3, 0)$ (d) $(7/4, 0)$ (e) $(0, 7/3)$
7. What is the slope of the line $2x + 3y = 5$?
(a) 2 (b) 3 (c) $2/3$ (d) $-2/3$ (e) $-3/2$
8. What is the equation of the line through the point $(3, -2)$ with slope -4 ?
(a) $4x + y - 10 = 0$ (b) $x - 4y = 11$ (c) $3x - 2y = -4$ (d) $y = -4x - 10$
(e) None of these
9. What is the slope of the line perpendicular to $3x - 4y = 10$?
(a) $3/4$ (b) $4/3$ (c) $-3/4$ (d) $10/3$ (e) $-4/3$
10. What is the equation of the line through the point $(-1, 2)$ parallel to the line $3x + y = 4$?
(a) $x - 3y = -7$ (b) $3x + y = 2$ (c) $y = 3x + 1$ (d) $3x + y + 1 = 0$
(e) None of these
11. What is the slope of the line joining the point $(3, -4)$ and the y -intercept of the line $3x + 2y = 6$?
(a) $-7/3$ (b) $3/7$ (c) 0 (d) $-3/2$ (e) None of these

12. What is the point of intersection of the lines $3x - 2y = 7$ and $4x + y = 2$?
 (a) $(-1, 2)$ (b) $(1, -2)$ (c) $(2, -1)$ (d) $(3, 4)$ (e) None of these
13. A line has slope -4 . If the difference in the x -coordinates of two points on the line is 5, what is the corresponding difference in the y -coordinates of the points?
 (a) 20 (b) -20 (c) $5/4$ (d) $-5/4$ (e) None of these
14. Which of the following pairs of points satisfy the inequality $3x - 2y \leq -6$?
 (a) $(0, 2), (3, 0)$ (b) $(1, 4), (-1, 0)$ (c) $(2, 0), (-1, 3)$ (d) $(-2, 0), (1, 5)$
 (e) None of these

Problems 15–17 refer to the feasible set described by the inequalities:

$$3x + y \leq 48, \quad x + y \leq 30, \quad x + 3y \leq 40, \quad x \geq 0, \quad y \geq 0.$$

15. Which of the following points is a corner for the feasible set?
 (a) $(0, 48)$ (b) $(30, 0)$ (c) $(9, 21)$ (d) $(13, 9)$ (e) None of these
16. Which of the following points is in the feasible set?
 (a) $(-1, -2)$ (b) $(1, 25)$ (c) $(16, 1)$ (d) $(1, 3)$ (e) None of these
17. How many corners does the feasible set have?
 (a) 2 (b) 3 (c) 4 (d) 5 (e) 6

For the remaining problems, use the following matrices:

$$A = \begin{pmatrix} 1 & 3 & 2 \\ -1 & 2 & 4 \end{pmatrix} \quad B = \begin{pmatrix} 6 & 3 & 5 \\ 7 & -1 & 2 \\ 8 & 4 & 1 \end{pmatrix} \quad C = (1, -2) \quad D = \begin{pmatrix} 1 & 3 \\ 2 & 4 \\ -5 & 1 \end{pmatrix}.$$

18. What is the $(2, 2)$ entry of $A - 2D^T$?
 (a) -8 (b) 12 (c) -1 (d) 4 (e) None of these
19. What is the $(1, 3)$ entry of AB ?
 (a) -1 (b) 5 (c) 13 (d) Does not exist (e) None of these
20. What is the $(3, 2)$ entry of CA ?
 (a) -1 (b) 2 (c) -4 (d) Does not exist (e) None of these
21. What is the $(2, 1)$ entry of BC ?
 (a) -12 (b) 3 (c) -4 (d) Does not exist (e) None of these
22. What is the $(3, 3)$ entry of B^2 ?
 (a) 49 (b) 1 (c) 81 (d) 30 (e) None of these
23. What is the $(1, 2)$ entry of $D^T B$?
 (a) 3 (b) 2 (c) -19 (d) Does not exist (e) None of these
24. What are the dimensions of the matrix ABD ?
 (a) 2×3 (b) 3×2 (c) 3×3 (d) 2×2 (e) None of these
25. If the matrix A is to be multiplied by a matrix E to form AE , which of the following are possible dimensions for matrix E ?
 (a) 2×3 (b) 3×5 (c) 2×4 (d) 1×3 (e) None of these