

MATH 1010 Midterm A February 7, 2008

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 solution of the equation $3(1 - 2x) - 2(x + 1) = -23$?
 (a) -3 (b) 6 (c) -6 (d) 3 (e) None of these
2. What is/are the solution of the equation $-1 + \frac{1}{3}(x + 2) = x - \frac{3-x}{2}$?
 (a) 7 (b) -7 (c) 1 (d) -1 (e) $\frac{3}{7}$
3. What is/are the solution of the equation $4(1 - \frac{1}{2}x) + 3(2 - \frac{1}{2}x) = 10 - 3x$?
 (a) $\frac{7}{2}$ (b) $-\frac{13}{2}$ (c) $-\frac{1}{2}$ (d) 0 (e) All real numbers
4. Which of the following inequalities is equivalent to $-2(1 - x) + 3(2x + 1) \leq -x + 13$?
 (a) $x \leq \frac{3}{4}$ (b) $x \leq \frac{4}{3}$ (c) $x \geq \frac{4}{3}$ (d) $x \geq \frac{-3}{4}$ (e) $x \leq \frac{14}{9}$
5. Which of the following inequalities is equivalent to $\frac{x}{7} + x - 1 \geq \frac{x-1}{7}$?
 (a) $x \geq \frac{6}{7}$ (b) $x \leq \frac{6}{7}$ (c) $x \geq \frac{6}{7}$ (d) $x \leq \frac{7}{6}$ (e) $x \geq \frac{2}{3}$
6. What is the equation of the vertical line through the origin?
 (a) $y = 0$ (b) $x = 0$ (c) $x + y = 0$ (d) $x = 0$ and $y = 0$ (e) none of these
7. What is the x -coordinate of the point on the line $4 - 2x + 5y = 0$ whose y -coordinate is 2 ?
 (a) 2 (b) -7 (c) 3 (d) 7 (e) $\frac{2}{5}$
8. What is the slope of the line $\frac{4-9x}{9} - y = 1$?
 (a) -1 (b) 1 (c) $\frac{4}{9}$ (d) $-\frac{9}{4}$ (e) 9
9. What is the equation of the line through the points $(0, 2)$ and $(1, 2)$?
 (a) $y = 4x - 6$ (b) $y = -4x + 6$ (c) $y = 2$ (d) $x = 1$ (e) There is no such line
10. What is the equation of the line through the origin and perpendicular to the line $y = -2x + 1$?
 (a) $x - 2y = 0$ (b) $2x - y = 0$ (c) $y + 2x = 0$ (d) $y = \frac{1}{2}x + 1$ (e) None of these
11. What is the equation of the line through the point $(2, -1)$ and parallel to the line $3x + y = 6$?
 (a) $y = 3x - 7$ (b) $y = -3x + 4$ (c) $y = -3x + 5$ (d) $y = 3x + 6$ (e) None of these
12. What is the point of intersection of the lines $3x - 2y = 23$ and $4x + 3y = 8$?
 (a) $(2, 0)$ (b) $(0, \frac{-23}{2})$ (c) $(-4, 5)$ (d) $(5, -4)$ (e) There is no intersection point
13. What is the slope of the line whose x and y intercepts are both 3 ?
 (a) 3 (b) -3 (c) 1 (d) -1 (e) $\frac{1}{3}$

14. What is the slope-intercept form of the equation of the line through the point $(\frac{1}{2}, 0)$ and perpendicular to the line $x = 4y - 10$?

(a) $y = 4x - 2$ (b) $y = -4x + 2$ (c) $y = 3x + \frac{1}{2}$ (d) $y = \frac{1}{2}x + 10$ (e) None of these

15. If $x \geq 0$ and $y \geq 0$ appear among other inequalities of a system of inequalities, which of the following statements is always true?

(a) Every point of the first quadrant is a feasible point.
 (b) Feasible set is part of the first quadrant.
 (c) $(0, 0)$ is always a corner point of the feasible set.
 (d) Feasible set is a polygon in the first quadrant.

16. Which of the following statements best describes all points that satisfy the inequalities:

$$x + y \geq 3, \quad x \geq 0, \quad x \leq 2$$

(a) All points above the line $x + y = 3$.
 (b) All points above the line $x + y = 3$, to the right of the y -axis and to the left of the line $x = 2$.
 (c) All points between the x -axis, the y -axis and below the line $x + y = 3$.
 (d) All points in the first quadrant below the line $x + y = 3$.
 (e) None of these.

Renting a car from *company A* costs \$93 plus 15 cents per kilometer. *Company B* Charges \$ 100 plus 8 cents per kilometer. Answer questions 17-19 :

17. Which company is cheaper if we plan to drive the car for 200 km?

(a) Company A (b) Company B (c) Both are the same

18. Which company is cheaper if we plan to drive the car for 100 km?

(a) Company A (b) Company B (c) Both are the same

19. Which company is cheaper if we plan to drive the car for 50 km?

(a) Company A (b) Company B (c) Both are the same

20. If a feasible set is a polygon with the corner points $(0, 0)$, $(2, 0)$, $(\frac{1}{2}, \frac{1}{2})$, $(0, 5)$; what are the maximum and minimum values of the objective function $P = 4x + 6y + 7$ over this feasible set?

(a) Max. $P = 7$, Min. $P = 0$ (b) Max. $P = 37$, Min. $P = 7$ (c) Max. $P = 15$, There is no minimum
 (d) Min. $P = 12$, There is no maximum (e) There is neither maximum nor minimum

21. The optimum value of the objective function in a linear programming problem is always unique.

(a) True (b) False

A feasible set is described by the following inequalities

$$x + 3y \leq 9, \quad x + y \leq 5, \quad x \leq 4, \quad x \geq 0, \quad y \geq 0$$

Answer question 22-25:

22. Which one of the following points is a corner point for the feasible set?

(a) $(3, 2)$ (b) $(0, 2)$ (c) $(4, 2)$ (d) $(0, 5)$ (e) $(9, 0)$

23. How many corner points does the feasible set have?

(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

24. Which of the points $(2, 2)$, $(0, 1)$, $(4, 2)$ are in the feasible set?

(a) $(2, 2)$, $(4, 2)$ only (b) $(2, 2)$, $(0, 1)$ only (c) $(0, 1)$, $(4, 2)$ only (d) all three points
 (e) none of the points

25. What is the minimum value of the objective function $P = 2x - 3y + 5$ over this feasible set?

(a) 0 (b) 5 (c) -4 (d) 13 (e) 10