Name_____

1) Which one is a solution of the following inequality: 1) _____
$2(2x - y) < 2(x + y) - 4$

A) $(0, 0)$ B) $(-1, -1)$ C) $(1, 1)$ D) $(1, 4)$ E) $(2, 2)$
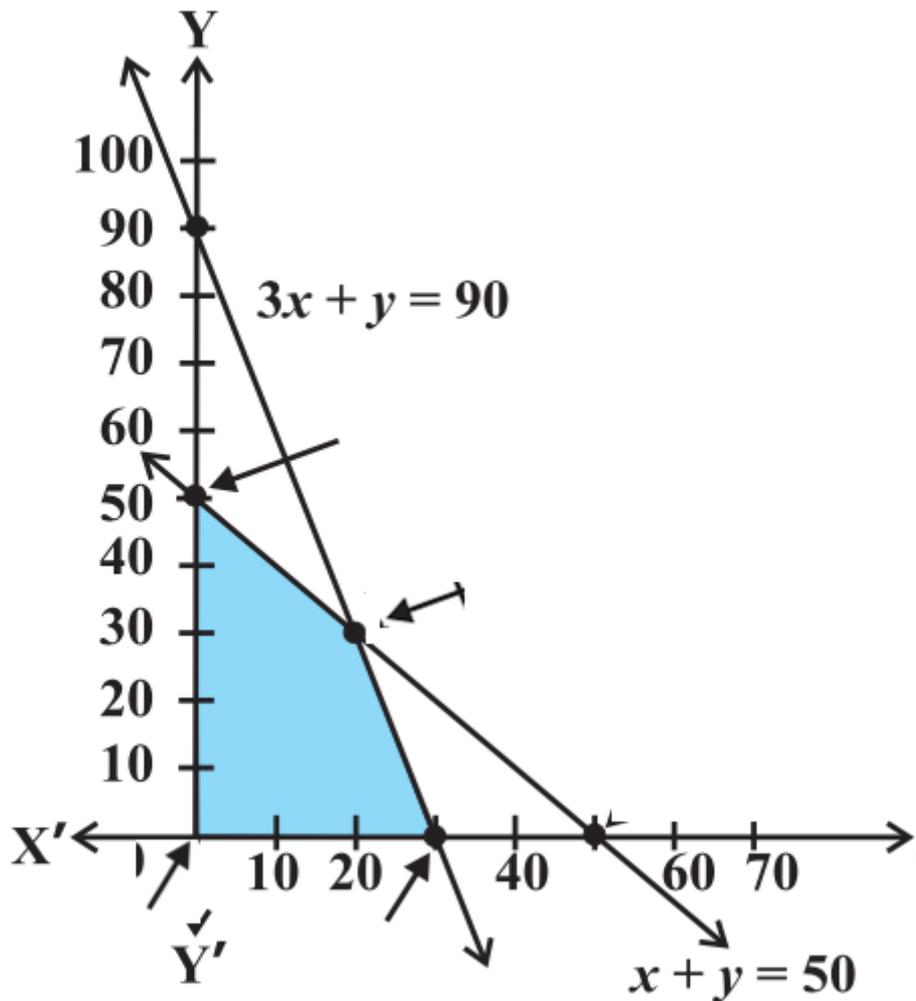
2) What is the maximum value of $G = 4x + y$ subject to   2) _____
$x + y \leq 50$
$3x + y \leq 90$
$x, y \geq 0$

A) 50   B) 110   C) 100   D) 120   E) 130

3) Find the number of parameters in the general solution of Ax = 0 if A is a 5 x 7 matrix of rank 3.
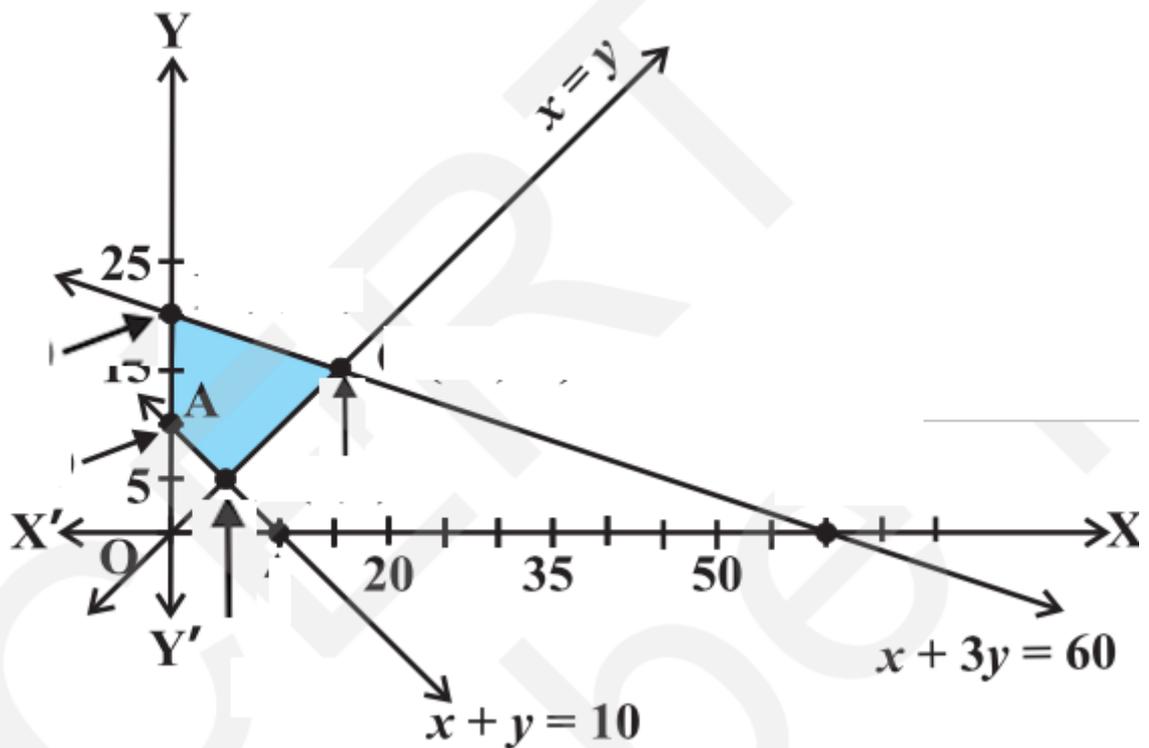
3) _____

  A) 0   B) 7   C) 3   D) 4   E) 5

4) What is the minimum value of $F = 3x + 9y$ subject to

4) _____

$$x + 3y \leq 60$$
$$x + y \geq 10$$
$$x \leq y$$
$$x, y \geq 0$$

x = y

x + 3y = 60

x + y = 10

  A) 180   B) 50   C) 70   D) 60   E) 40

5) The distance between the points P(-2, - 1, -4), Q(2, - 1, -4) is equal to

5) _____

  A) $\sqrt{84}$ B) 4   C) $\sqrt{19}$ D) 2   E) 0

6) We are given the following system of linear inequalities : 6) _____

$$\begin{cases} 2x + y \ge 5 \\ 3x + y \ge 4 \\ x + 2y \ge 3 \\ x, y \ge 0 \end{cases}$$

Which one of the following point is in the domain ?

A) $(0, -1)$ B) $(1, 2)$ C) $(2, 3)$ D) $(-2, -5)$ E) $(0, 0)$

7) Let A be a 7 x 7 invertible matrix. Then Rank is 7) _____
    A) 1   B) 7   C) 14   D) 0   E) 49

8) In R^3, the equation $4(x - 2) + 2y - 5(z + 1) = 0$ represents 8) _____
    A) A plane through $(4, 2, -5)$ with normal n $= (2, 0, -1)$
    B) A plane through $(0, 0, 0)$ with normal n $= (2, 0, -1)$
    C) A plane through $(0, 0, 0)$ with normal n $= (4, 2, -5)$
    D) A plane through $(2, 1, 0)$ with normal n $= (-5, 2, 4)$
    E) A plane through $(2, 0, -1)$ with normal n $= (4, 2, -5)$

9) **We are given the following problem:** A manufacturer produces two 9) _____
types of DVD player: Vista and Xtreme. During production, the
players require the use of two machines, A and B. A Vista DVD
requires 1 hour on Machine A and 2 hours on Machine B. An Xtreme
DVD requires 3 hours on Machine A and 2 hours on Machine B.
If each machine can be used 24 hours a day, and the profits on the
Vista and Xtreme models are $50 and $80, respectively, how many of
each type of player should be made per day to obtain maximum
profit? Let x and y be numbers of Vista and Xtreme DVD players
should me made per day to obtain maximum profit. Set up the linear
programming problem:

$$\begin{cases} \text{Maximize: } 80x + 50y \\ x + 2y \le 24 \\ 3x + 2y \le 24 \\ x, y \ge 0 \end{cases}$$
A)

Other options are on the next page

B) $\begin{cases} \text{Maximize: } 50x + y \\ x + 3y \leq 48 \\ 2x + 2y \leq 48 \\ x, y \geq 0 \end{cases}$

C) $\begin{cases} \text{Maximize: } x + y \\ x + 3y \leq 12 \\ 2x + 2y \leq 12 \\ x, y \geq 0 \end{cases}$

D) $\begin{cases} \text{Maximize: } 50x + 80y \\ x + 3y \leq 24 \\ 2x + 2y \leq 24 \\ x, y \geq 0 \end{cases}$

E) $\begin{cases} \text{Maximize: } x + 80y \\ x + 3y \leq 12 \\ 2x + 2y \leq 12 \\ x, y \geq 0 \end{cases}$

10) The cross product is a mathematical operation performed between   10) _____
   A) two matrices of the same size
   B) two numbers
   C) a matrix and a number
   D) a number and a vector
   E) two vectors in R^3

11) Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}$. Then Nullity is   11) _____

   A) 3   B) 5   C) 1   D) 4   E) 2

12) Let u and v be two vectors in R^2 and $u \cdot v > 0$. Then the angle between u and v is

    A) right

    B) 120 degrees

    C) acute

    D) straight

    E) obtuse

12) _____

13) The distance between the point (2, 3) and the line $y = x + 5$ is

    A) $\dfrac{1}{\sqrt{2}}$ B) $\dfrac{6}{\sqrt{2}}$ C) $\dfrac{7}{\sqrt{2}}$ D) $\dfrac{4}{\sqrt{2}}$ E) $\dfrac{8}{\sqrt{2}}$

13) _____

14) Let $u = (2, 0, 1)$ and $a = (1, 2, 3)$. Then $\text{proj}_a\, u$ is

    A) $\left(-\dfrac{1}{14}, \dfrac{1}{14}, \dfrac{-2}{14}\right)$

    B) $\left(\dfrac{5}{14}, \dfrac{10}{14}, \dfrac{15}{14}\right)$

    C) $\left(\dfrac{10}{7}, \dfrac{15}{7}, \dfrac{35}{7}\right)$

    D) $\left(\dfrac{15}{14}, 0, \dfrac{3}{14}\right)$

    E) $\left(\dfrac{15}{14}, \dfrac{25}{14}, \dfrac{35}{14}\right)$

14) _____

15) Let $u = (1, 0, -1, 2, 0)$ and $v = (1, 1, -1, -1, 0)$. Then $\|u\|^2 + \|v\|$ is

    A) $6 + \sqrt{2}$ B) 8   C) 10   D) 6   E) $2 + \sqrt{6}$

15) _____