Basic Concepts

1. If $p, q, r \in \mathbf{N}$, which of the following statements is true?

   A. If $p > q$ and $q > r$, then $r = p$.
   B. If $p > q$ and $q = r$, then $r < p$.
   C. If $p = q$ and $q < r$, then $r < p$.
   D. If $p < q$ and $q < r$, then $r < p$.
   E. If $p < q$ and $q = r$, then $r < p$.

   [1972-CE-MATHS B1-13]

2. If $0 < x < 1$, then of the four numbers x, x^2, $\frac{1}{x}$ and $\sqrt{x}$, which is the largest and which is the smallest?

   A. x largest, x^2 smallest
   B. $\frac{1}{x}$ largest, $\sqrt{x}$ smallest
   C. $\frac{1}{x}$ largest, x^2 smallest
   D. $\sqrt{x}$ largest, x smallest
   E. $\sqrt{x}$ largest, x^2 smallest

   [1977-CE-MATHS 2-9]

3. If $0 < x < 1$, which of x, x^2, $\frac{1}{x}$, $\sqrt{x}$ is the smallest? Which is the largest?

   A. $\sqrt{x}$ is the smallest, x^2 is the largest
   B. $\frac{1}{x}$ is the smallest, x is the largest
   C. x is the smallest, $\frac{1}{x}$ is the largest
   D. x^2 is the smallest, $\frac{1}{x}$ is the largest
   E. x^2 is the smallest, $\sqrt{x}$ is the largest

   [1980-CE-MATHS 2-34]

4. If x and y are real numbers, what is the minimum value of the expression $(x+y)^2 - 1$?

   A. -5
   B. -1
   C. 0
   D. 3
   E. It cannot be determined

   [1980-CE-MATHS 2-38]

5. a, b and k are real numbers. If $k > 0$ and $a > b$, which of the following **must** be true?

   (1) $a^2 > b^2$
   (2) $-a < -b$
   (3) $ka > kb$

   A. (2) only
   B. (3) only
   C. (1) and (3) only
   D. (2) and (3) only
   E. (1), (2) and (3)

   [1982-CE-MATHS 2-34]

6. If a and b are non-zero real numbers and $a > b$, which of the following **must** be true?

   (1) $a^2 > b^2$
   (2) $\frac{1}{a} > \frac{1}{b}$
   (3) $a^3 > b^3$

   A. (2) only
   B. (3) only
   C. (1) and (2) only
   D. (2) and (3) only
   E. (1) and (3) only

   [1984-CE-MATHS 2-35]

7. If $a > 0$ and $b < 0$, which of the following is / are negative?

   (1) $\frac{1}{a} - \frac{1}{b}$
   (2) $\frac{a}{b} + \frac{b}{a}$
   (3) $\frac{a^2}{b} - \frac{b^2}{a}$

   A. (1) only
   B. (3) only
   C. (1) and (2) only
   D. (1) and (3) only
   E. (2) and (3) only

   [1986-CE-MATHS 2-36]

8. If $2 < x < 3$ and $3 < y < 4$, then the range of values of $\frac{x}{y}$ is

   A. $\frac{1}{2} < \frac{x}{y} < \frac{3}{4}$.
   B. $\frac{1}{2} < \frac{x}{y} < 1$.
   C. $\frac{2}{3} < \frac{x}{y} < \frac{3}{4}$.
   D. $\frac{2}{3} < \frac{x}{y} < 1$.
   E. $\frac{4}{3} < \frac{x}{y} < \frac{3}{2}$.

   [1986-CE-MATHS 2-37]

9. If x and y are integers with $x > y$, which of the following is / are true?

(1) $x^2 > y^2$

(2) $\frac{1}{x} < \frac{1}{y}$

(3) $10^x > 10^y$

A. (3) only
B. (1) and (2) only
C. (1) and (3) only
D. (2) and (3) only
E. (1), (2) and (3)

[1987-CE-MATHS 2-36]

10. If $3x > -2y$ and $y < 0$, then

A. $\frac{x}{y} > -\frac{3}{2}$.
B. $\frac{x}{y} > \frac{2}{3}$.
C. $\frac{x}{y} < \frac{2}{3}$.
D. $\frac{x}{y} > -\frac{2}{3}$.
E. $\frac{x}{y} < -\frac{2}{3}$.

[1989-CE-MATHS 2-7]

11. If $a < b < 0$, which of the following **must** be true?

A. $-a < -b$
B. $\frac{a}{b} < 1$
C. $a^2 < b^2$
D. $10^a < 10^b$
E. $a^{-1} < b^{-1}$

[1990-CE-MATHS 2-36]

12. If $x < 0 < y$, then which one of the following **must** be positive?

A. $x + y$
B. $x - y$
C. $y - x$
D. xy
E. $\frac{y}{x}$

[1991-CE-MATHS 2-37]

13. If $a < b < 0$, then which of the following **must** be true?

(1) $a^2 < b^2$

(2) $ab < a^2$

(3) $\frac{1}{a} < \frac{1}{b}$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (1) and (3) only

[1997-CE-MATHS 2-33]

14. If $a > b$, which of the following **must** be true?

(1) $-a < -b$

(2) $a + b > b$

(3) $a^2 > b^2$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (2) only
E. (1), (2) and (3)

[2001-CE-MATHS 2-38]

15. If a and b are real numbers such that $ab > 0$, which of the following **must** be true?

(1) $\frac{a}{b} > 0$

(2) $a + b > 0$

(3) $a^2 + b^2 > 0$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2010-CE-MATHS 2-11]

16. If x and y are non-zero numbers with $x < y$, which of the following **must** be true?

(1) $-x > -y$

(2) $\frac{1}{x^2} > \frac{1}{y^2}$

(3) $x^3 < y^3$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2011-CE-MATHS 2-4]

Linear Inequalities

17. Which of the following inequalities is equivalent to $2m - 5n < 9$?

A. $n < \dfrac{9 - 2m}{5}$

B. $n < \dfrac{2m - 9}{5}$

C. $n < \dfrac{2m + 9}{5}$

D. $n > \dfrac{2m - 9}{5}$

E. $n > \dfrac{2m + 9}{5}$

[1977-CE-MATHS 2-33]

18. If $a - 3b < 5$, then

A. $b < \dfrac{5 - a}{3}$.

B. $b < \dfrac{a - 5}{3}$.

C. $b < \dfrac{a + 5}{3}$.

D. $b > \dfrac{a - 5}{3}$.

E. $b > \dfrac{a + 5}{3}$.

[SP-CE-MATHS 2-8]

19. $3x - 2y > 6$ is equivalent to

A. $y > \frac{3}{2}x + 3$.

B. $y > \frac{3}{2}x - 3$.

C. $y < \frac{3}{2}x + 3$.

D. $y < \frac{3}{2}x - 3$.

E. $y < 3 - \frac{3}{2}x$.

[1978-CE-MATHS 2-16]

20. Which of the following is equivalent to $y > 2 + 5x + 4y$?

A. $y > \dfrac{2 + 5x}{3}$

B. $y < \dfrac{2 + 5x}{3}$

C. $y > -\dfrac{2 + 5x}{3}$

D. $y < -\dfrac{2 + 5x}{3}$

E. $y > \dfrac{2 + 5x}{5}$

[1979-CE-MATHS 2-22]

21. $2y - 3 > 4y + 2x + 5$ is equivalent to

A. $y > x + 4$.
B. $y < x + 4$.
C. $y > -x - 4$.
D. $y < -x - 4$.
E. $y > x + 1$.

[1981-CE-MATHS 2-10]

22. Let $a > 2$. The inequality $2x - 2a < ax + 5a$ is equivalent to

A. $x > \dfrac{7a}{2 - a}$.

B. $x < \dfrac{7a}{2 - a}$.

C. $x > \dfrac{-3a}{2 - a}$.

D. $x < \dfrac{-3a}{2 - a}$.

E. $x > \dfrac{-7a}{2 - a}$.

[1982-CE-MATHS 2-32]

23. $2x - 3a - 4 > 3x + 5a + 6$ is equivalent to

A. $x > -8a - 10$.
B. $x > 2a - 10$.
C. $x < -8a - 10$.
D. $x < \frac{1}{5}(2a + 2)$.
E. $x > \frac{1}{5}(2a + 2)$.

[1983-CE-MATHS 2-8]

24. Solve the inequality $x \log_{10} 0.1 > \log_{10} 10$.

A. $x > -1$
B. $x > 1$
C. $x > 100$
D. $x < 1$
E. $x < -1$

[1987-CE-MATHS 2-37]

25. The solution of $2(3 - x) > -4$ is

A. $x < 5$.
B. $x > 5$.
C. $x < 10$.
D. $x > 10$.

[2005-CE-MATHS 2-9]

26. The solution of $15 \geq 4(x + 2) - 1$ is

A. $x \leq -2$.
B. $x \leq 2$.
C. $x \geq -2$.
D. $x \geq 2$.

[2007-CE-MATHS 2-6]

27. If x is a positive integer satisfying the inequality $x - 5 \leq 1 - x$, then the least value of x is

A. 0 .
B. 1 .
C. 2 .
D. 3 .

[2009-CE-MATHS 2-9]

28. The solution of $2(1 - x) + 5 \geq 17$ is

A. $x \leq -5$.
B. $x \geq -5$.
C. $x \leq -12$.
D. $x \geq -12$.

[2011-CE-MATHS 2-5]

Compound Linear Inequalities

29. Find the values of x which satisfy both $-x < 4$ and $\dfrac{2x - 16}{3} > -2$.

A. $-4 < x < 5$
B. $x < -4$
C. $x > -4$
D. $x < 5$
E. $x > 5$

[1995-CE-MATHS 2-9]

30. Solve $1 < -3x + 4 < 10$.

A. $-2 < x < 1$
B. $-1 < x < 2$
C. $x < -2$ or $x > 1$
D. $x < -1$ or $x > 2$
E. no solution

[1996-CE-MATHS 2-7]

31. Find the values of x which satisfy both $x + 3 > 0$ and $-2x < 1$.

A. $x > -3$
B. $x > -\dfrac{1}{2}$
C. $x > \dfrac{1}{2}$
D. $-3 < x < -\dfrac{1}{2}$
E. $-3 < x < \dfrac{1}{2}$

[2000-CE-MATHS 2-6]

32. The solution of $x > 1$ and $13 < 3x - 2 < 25$ is

A. $x > 1$.
B. $1 < x < 5$.
C. $1 < x < 9$.
D. $5 < x < 9$.

[2003-CE-MATHS 2-8]

33. The solution of $-2x < 3 - x$ or $3x + 3 > 0$ is

A. $x > -3$.
B. $x > -1$.
C. $-3 < x < -1$.
D. $x < -3$ or $x > -1$.

[2004-CE-MATHS 2-9]

HKDSE Problems

34. The solution of $5 - 2x < 3$ and $4x + 8 > 0$ is

A. $x > -2$.
B. $x > -1$.
C. $x > 1$.
D. $-2 < x < 1$.

[SP-DSE-MATHS 2-9]

35. The solution of $4x > x - 3$ or $3 - x < x + 7$ is

A. $x > -2$.
B. $x < -2$.
C. $x > -1$.
D. $x < -2$ or $x > -1$.

[PP-DSE-MATHS 2-9]

36. The solution of $15 + 4x < 3$ or $9 - 2x > 1$ is

A. $x < -3$.
B. $x > -3$.
C. $x < 4$.
D. $x > 4$.

[2012-DSE-MATHS 2-7]

37. The solution of $x - \dfrac{x-1}{2} > 5$ or $1 < x - 11$ is

A. $x > 9$.
B. $x > 10$.
C. $x > 11$.
D. $x > 12$.

[2013-DSE-MATHS 2-5]

38. If $a > b$ and $k < 0$, which of the following **must** be true?

(1) $a^2 > b^2$
(2) $a + k > b + k$
(3) $\frac{a}{k^2} > \frac{b}{k^2}$

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

[2014-DSE-MATHS 2-6]

39. The solution of $-3x < 6 < 2x$ is

A. $x > -2$.
B. $x > 0$.
C. $x > 3$.
D. $-2 < x < 3$.

[2014-DSE-MATHS 2-7]

40. The solution of $18 + 7x > 4$ or $5 - 2x < 3$ is

A. $x > -2$.
B. $x > -1$.
C. $x > 1$.
D. $-2 < x < 1$.

[2015-DSE-MATHS 2-6]

41. The solution of $-5x > 21 - 2x$ and $6x - 18 < 0$ is

A. $x < -7$.
B. $x < 3$.
C. $-7 < x < 3$.
D. $x < -7$ or $x > 3$.

[2016-DSE-MATHS 2-7]

42. The solution of $6 - x < 2x - 3$ or $7 - 3x > 1$ is

A. $x < 2$.
B. $x > 3$.
C. $2 < x < 3$.
D. $x < 2$ or $x > 3$.

[2017-DSE-MATHS 2-5]

43. The solution of $\frac{1-2x}{3} \geq x - 3$ or $4x + 9 < 1$ is

A. $x < -2$
B. $x > -2$
C. $x \leq 2$
D. $x \geq 2$

[2018-DSE-MATHS 2-13]

44. The least integer satisfying the compound inequality $-2(x-5) + 5 < 21$ or $\frac{3x-5}{7} > 1$ is

A. -3
B. -2
C. 4
D. 5

[2019-DSE-MATHS 2-7]

45. The solution of $5 - 4x < 9$ and $\frac{2x-3}{7} > 1$ is

A. $x < -1$
B. $x > -1$
C. $x < 5$
D. $x > 5$

[2020-DSE-MATHS 2-13]

Quadratic Inequalities

1. For all $x \in \mathbf{R}$ such that $P = \{x : x(3x+2) > 0\}$ and $Q = \{x : 3x^2 - x - 2 < 0\}$, what is $P \cap Q$?

   A. $\{x : x > 1\}$
   B. $\{x : x < -\frac{2}{3}\}$
   C. $\{x : x < -\frac{2}{3} \text{ or } x > 1\}$
   D. $\{x : -\frac{2}{3} < x < 0\}$
   E. $\{x : 0 < x < 1\}$

   [1972-CE-MATHS B1-20]

2. Solve the inequality $(4x+3)(x-4) > 0$.

   A. $x > 4$
   B. $4 > x > -\frac{3}{4}$
   C. $-\frac{3}{4} > x$
   D. $-\frac{3}{4} > x$ or $x > 4$
   E. $x > -\frac{3}{4}$

   [1980-CE-MATHS 2-9]

3. $2x^2 - 2 \leq 0$ is equivalent to

   A. $x \leq 1$.
   B. $x \geq -1$.
   C. $-1 \leq x \leq 1$.
   D. $x \geq 1$ or $x \leq -1$.
   E. $x \leq 1$ or $x \geq -1$.

   [1981-CE-MATHS 2-29]

4. $5 - 9x - 2x^2 > 0$ is equivalent to

   A. $x > \frac{1}{2}$.
   B. $x < -5$.
   C. $-5 < x < \frac{1}{2}$.
   D. $x < -5$ or $x > \frac{1}{2}$.
   E. $x > -5$ or $x < \frac{1}{2}$.

   [1982-CE-MATHS 2-8]

5. $12 - x - x^2 < 0$ is equivalent to

   A. $x < -4$.
   B. $x > 3$.
   C. $-4 < x < 3$.
   D. $x < -3$ or $x > 4$.
   E. $x < -4$ or $x > 3$.

   [1983-CE-MATHS 2-34]

6. $4x^2 - 9 \geq 0$ is equivalent to

   A. $x \geq \frac{3}{2}$ or $x \geq -\frac{3}{2}$.
   B. $\frac{3}{2} \leq x \leq -\frac{3}{2}$.
   C. $-\frac{3}{2} \leq x \leq \frac{3}{2}$.
   D. $x \geq -\frac{3}{2}$ or $x \leq \frac{3}{2}$.
   E. $x \leq -\frac{3}{2}$ or $x \geq \frac{3}{2}$.

   [1984-CE-MATHS 2-33]

7. What is the following is the solution of $(x-1)(x-3) \leq 0$ and $x - 2 \leq 0$?

   A. $x \leq 2$
   B. $x \leq 3$
   C. $2 \leq x \leq 3$
   D. $1 \leq x \leq 2$
   E. $1 \leq x \leq 3$

   [1985-CE-MATHS 2-36]

8. How many integers x satisfy the inequality $6x^2 - 7x - 20 \leq 0$?

   A. 0
   B. 1
   C. 2
   D. 3
   E. 4

   [1992-CE-MATHS 2-37]

9. If the solution of the inequality $x^2 - ax + 6 \leq 0$ is $c \leq x \leq 3$, then

   A. $a = 5$, $c = 2$.
   B. $a = -5$, $c = 2$.
   C. $a = 5$, $c = -2$.
   D. $a = 1$, $c = -2$.
   E. $a = -1$, $c = 2$.

   [1993-CE-MATHS 2-40]

10. If $x(x+1) < 5(x+1)$, then

    A. $x < 5$.
    B. $x < -5$ or $x > 1$.
    C. $x < -1$ or $x > 5$.
    D. $-5 < x < 1$.
    E. $-1 < x < 5$.

    [1994-CE-MATHS 2-6]

11. If 3 is a root of the equation $x^2 - x + c = 0$, solve $x^2 - x + c > 0$.

    A. $x < -2$ or $x > 3$
    B. $x < 2$ or $x > 3$
    C. $x > -6$
    D. $-2 < x < 3$
    E. $2 < x < 3$

    [1996-CE-MATHS 2-40]

12. Find the values of x which satisfy both $-2x < 3$ and $(x+3)(x-2) < 0$.

    A. $x < -3$
    B. $x > 2$
    C. $-3 < x < -\frac{3}{2}$
    D. $-\frac{3}{2} < x < 2$
    E. $x < -3$ or $x > -\frac{3}{2}$

[1997-CE-MATHS 2-32]

13. Solve $x^2 + 5x - 6 \le 0$.

    A. $-6 \le x \le 1$
    B. $-3 \le x \le -2$
    C. $-1 \le x \le 6$
    D. $x \le -6$ or $x \ge 1$
    E. $x \le -1$ or $x \ge 6$

[1998-CE-MATHS 2-3]

14. Solve $x^2 + 10x - 24 > 0$.

    A. $x < -12$ or $x > 2$
    B. $x < -6$ or $x > -4$
    C. $x < -2$ or $x > 12$
    D. $-12 < x < 2$
    E. $-2 < x < 12$

[1999-CE-MATHS 2-7]

15. Solve $(2x-1)^2 + 2(2x-1) - 3 > 0$.

    A. $0 < x < 2$
    B. $-1 < x < 1$
    C. $x < 0$ or $x > 2$
    D. $x < -1$ or $x > 1$

[2002-CE-MATHS 2-9]

Nature of Quadratic Roots

16. If the roots of the equation $x^2 + x + m = 0$ are real ; and the roots of the equation $-mx^2 + x + 1 = 0$ are imaginary, which of the following is the condition on m that satisfies both statements?

    A. $m < -\frac{1}{4}$
    B. $m \le \frac{1}{4}$
    C. $-\frac{1}{4} < m < \frac{1}{4}$
    D. $-\frac{1}{4} \le m < \frac{1}{4}$
    E. $-\frac{1}{4} < m \le \frac{1}{4}$

[1972-CE-MATHS B1-19]

17. If $x^2 - kx + 9 \ge 0$ for all real values of x, what is the value of k?

    A. $k = -6$ only
    B. $k = 6$ only
    C. $-6 \le k \le 6$
    D. $k = 6$ or -6 only
    E. $k \le -6$ or $k \ge 6$

[1980-CE-MATHS 2-37]

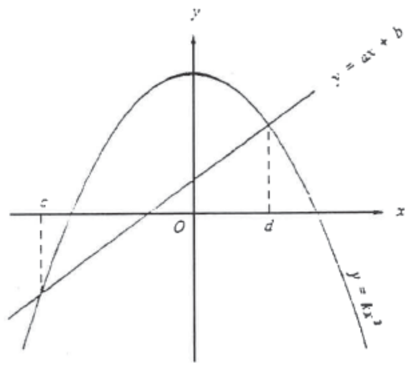
18. Find the range of values of k such that the equation $x^2 + (k-2)x + 1 = 0$ has real roots.

    A. $k = 4$
    B. $0 < k < 4$
    C. $0 \le k \le 4$
    D. $k < 0$ or $k > 4$
    E. $k \le 0$ or $k \ge 4$

[1995-CE-MATHS 2-40]

Graphical Method

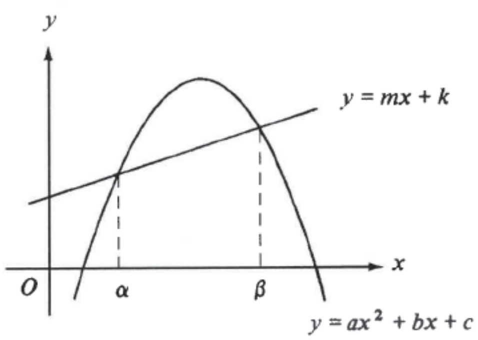
19. In the figure, the line $y = ax + b$ cuts the curve $y = kx^2$ at $x = c$ and $x = d$. Find the range of values of x for which $kx^2 < ax + b$.



    A. $c < x < d$
    B. $c < x < 0$
    C. $x < c$ or $x > d$
    D. $x < c$
    E. $x > d$

[1988-CE-MATHS 2-37]

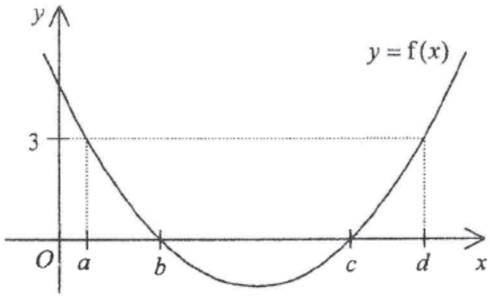
20. From the figure, if $\alpha \le x \le \beta$, then



A. $ax^2 + (b-m)x + (c-k) \le 0$.
B. $ax^2 + (b-m)x + (c-k) < 0$.
C. $ax^2 + (b-m)x + (c-k) = 0$.
D. $ax^2 + (b-m)x + (c-k) > 0$.
E. $ax^2 + (b-m)x + (c-k) \ge 0$.

[1992-CE-MATHS 2-38]

21. The figure shows the graph of $y = f(x)$, where $f(x)$ is a quadratic function. The solution of $f(x) < 3$ is



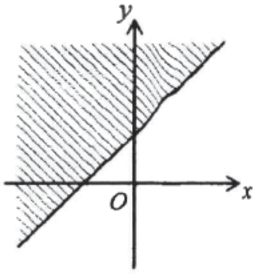
A. $a < x < d$.
B. $b < x < c$.
C. $x < a$ or $x > d$.
D. $x < b$ or $x > c$.

[2008-CE-MATHS 2-10]

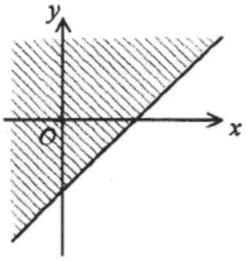
Linear Inequalities

1. If $b < 0$ and $c < 0$, which of the following shaded regions may represent the solution of $x + by + c \geq 0$?

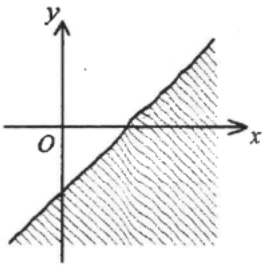
A.



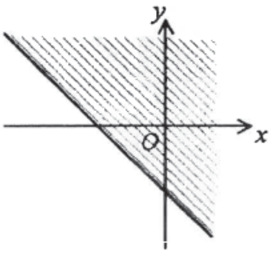
B.



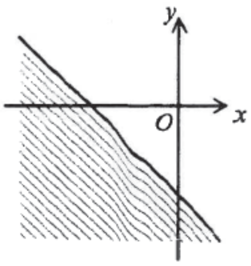
C.



D.



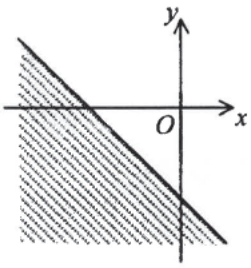
E.



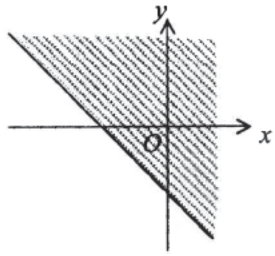
[1998-CE-MATHS 2-41]

2. Which of the following shaded regions may represent the solution of $x \leq y - 2$?

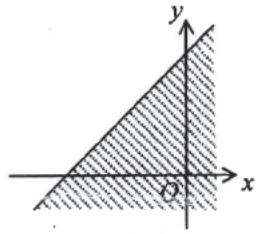
A.



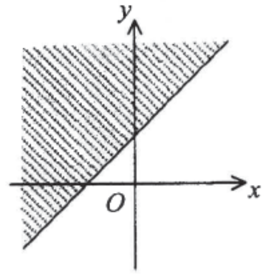
B.



C.



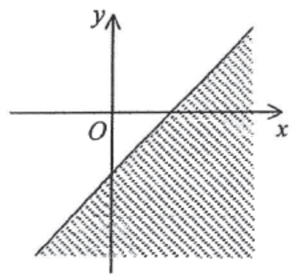
D.



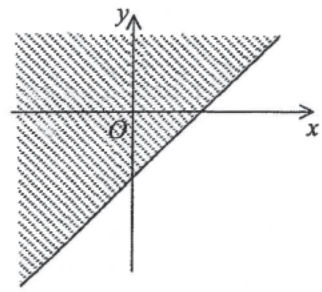
[2004-CE-MATHS 2-43]

3. Which of the following shaded regions may represent the solution of $y \leq x - 9$?

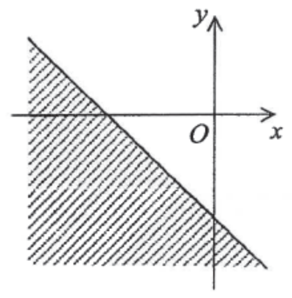
A.



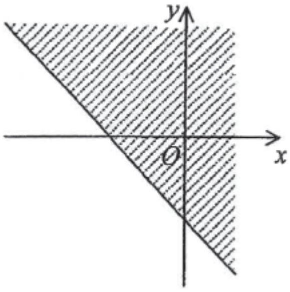
B.



C.

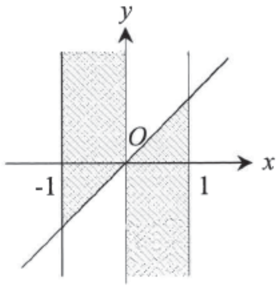


D.



[2009-CE-MATHS 2-44]

E.

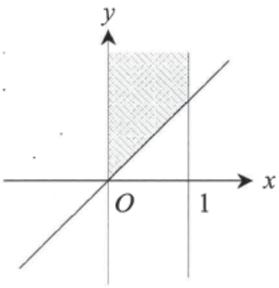


[1977-CE-MATHS 2-37]

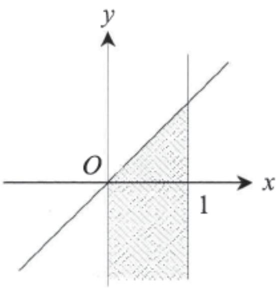
Feasible Regions

4. Which of the following shaded regions represents the solution set of $x - y \geq 0$ and $x^2 \leq 1$?

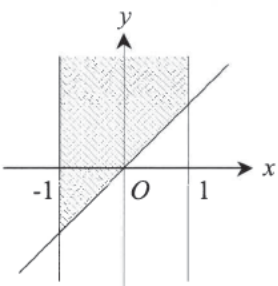
A.



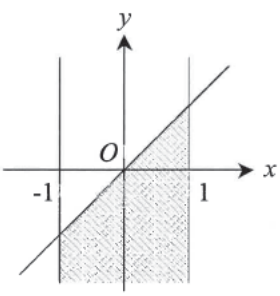
B.



C.

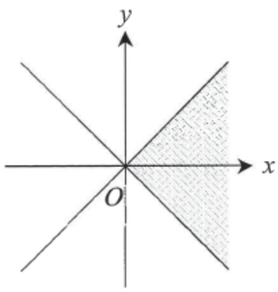


D.

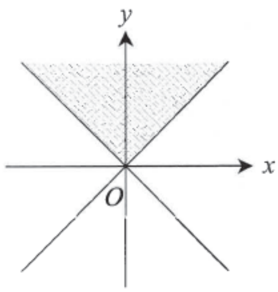


5. Which of the following shaded regions represents the solution set of $x + y \geq 0$ and $x - y \geq 0$?

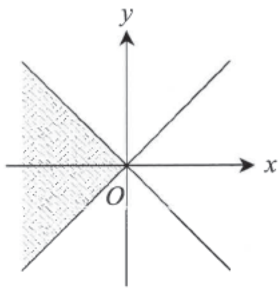
A.



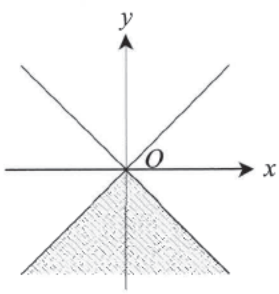
B.



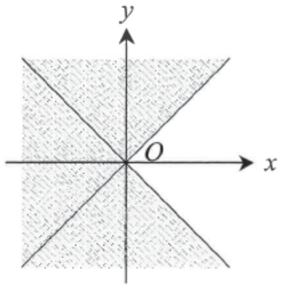
C.



D.



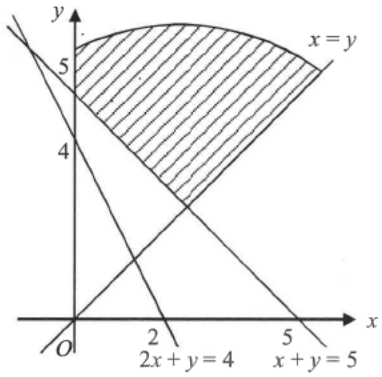
E.



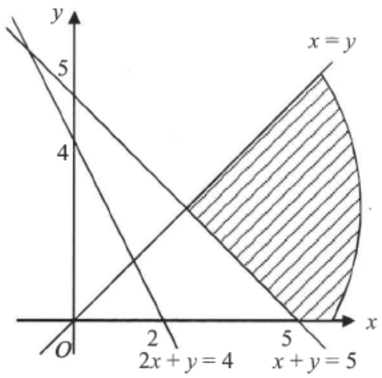
[1978-CE-MATHS 2-49]

6. If $\begin{cases} x \ge 0, \\ y \ge 0, \\ x + y \le 5, \\ 2x + y \ge 4, \\ x \ge y, \end{cases}$ in which of the following shaded regions do all the points satisfy the above inequalities?

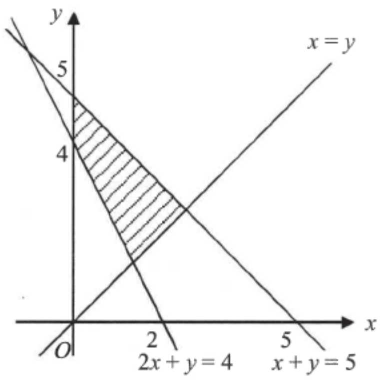
A.



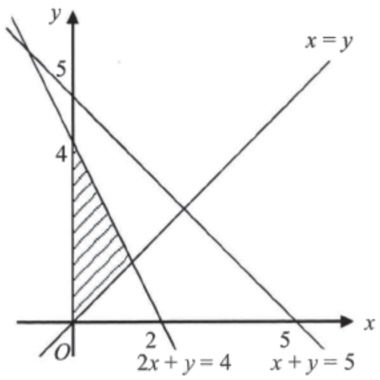
B.



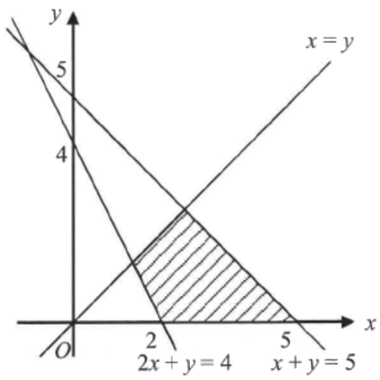
C.



D.

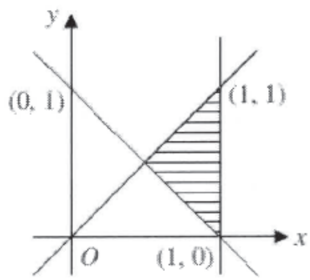


E.



[1982-CE-MATHS 2-33]

7.



Which of the following systems of inequalities determine the shaded region in the figure?

A. $\begin{cases} x \ge 1 \\ x + y \ge 1 \\ x \ge y \end{cases}$

B. $\begin{cases} x \ge 1 \\ x + y \le 1 \\ x \ge y \end{cases}$

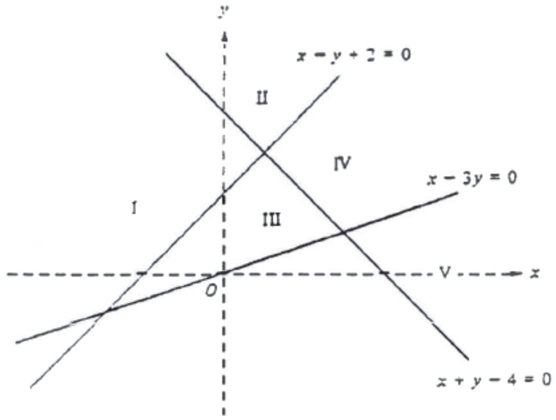
C. $\begin{cases} x \le 1 \\ x + y \le 1 \\ x \le y \end{cases}$

D. $\begin{cases} x \le 1 \\ x + y \le 1 \\ x \ge y \end{cases}$

E. $\begin{cases} x \le 1 \\ x + y \ge 1 \\ x \ge y \end{cases}$

[1985-CE-MATHS 2-37]

8.



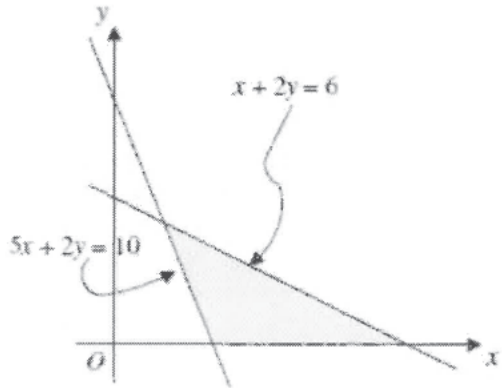
In the figure, which region represents the solution to the following inequalities?

$$\begin{cases} x - 3y \le 0 \\ x - y + 2 \ge 0 \\ x + y - 4 \ge 0 \end{cases}$$

A. I
B. II
C. III
D. IV
E. V

[1988-CE-MATHS 2-36]

9.



Which of the following systems of inequalities is represented by the shaded region in the figure?

A. $\begin{cases} x + 2y \ge 6 \\ 5x + 2y \ge 10 \\ y \ge 0 \end{cases}$

B. $\begin{cases} x + 2y \le 6 \\ 5x + 2y \le 10 \\ x \ge 0 \end{cases}$

C. $\begin{cases} x + 2y \ge 6 \\ 5x + 2y \le 10 \\ x \ge 0 \end{cases}$

D. $\begin{cases} x + 2y \le 6 \\ 5x + 2y \ge 10 \\ y \ge 0 \end{cases}$

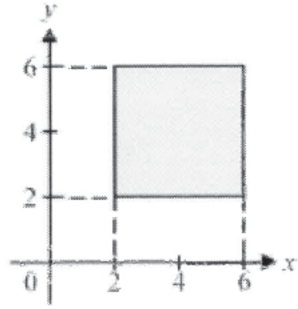
E. $\begin{cases} x + 2y \ge 6 \\ 5x + 2y \le 10 \\ y \ge 0 \end{cases}$

[1989-CE-MATHS 2-5]

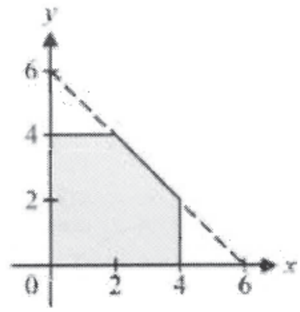
10. Which one of the following shaded regions represents the solution of

$$\begin{cases} 2 \le x + y \le 6 \\ 0 \le x \le 4 \\ 0 \le y \le 4 \end{cases} \quad ?$$

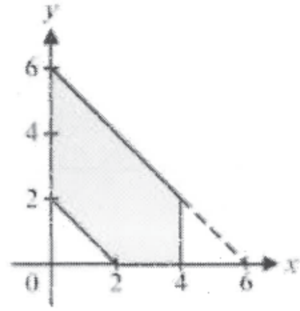
A.



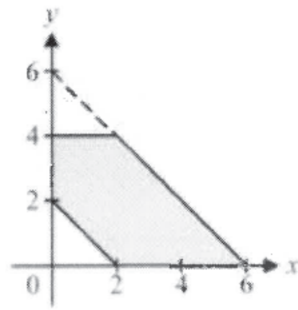
B.



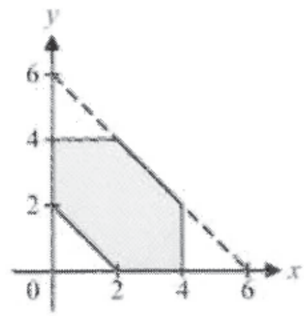
C.



D.

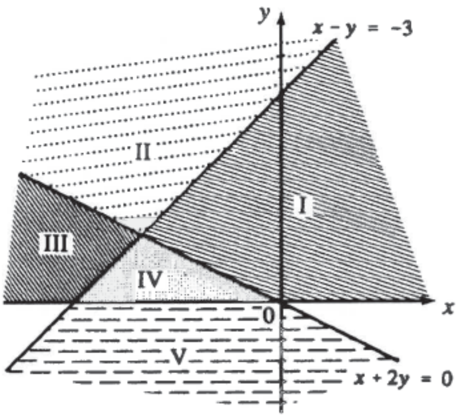


E.



[1991-CE-MATHS 2-38]

11.



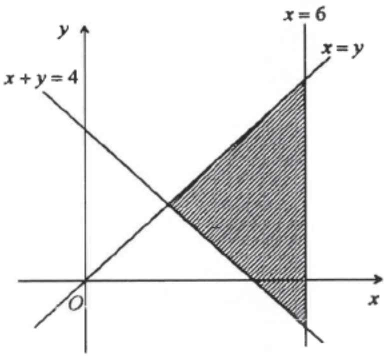
Which of the following shaded regions represents the solution of

$$\begin{cases} y \ge 0 \\ x - y \ge -3 \\ x + 2y \le 0 \end{cases} ?$$

A. I
B. II
C. III
D. IV
E. V

[1995-CE-MATHS 2-8]

12.



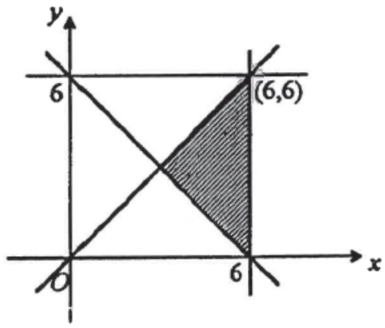
In the figure, (x, y) is any point in the shaded region (including the boundary). Which of the following is/are true?

(1) $x \le y$
(2) $x + y \le 4$
(3) $x \le 6$

A. (1) only
B. (2) only
C. (3) only
D. (1) and (3) only
E. (2) and (3) only

[1996-CE-MATHS 2-9]

13.



Which of the following systems of inequalities has its solution represented by the shaded region in the figure?

A. $\begin{cases} x + y \ge 6 \\ x \ge y \\ x \le 6 \end{cases}$

B. $\begin{cases} x + y \ge 6 \\ x \ge y \\ y \le 6 \end{cases}$

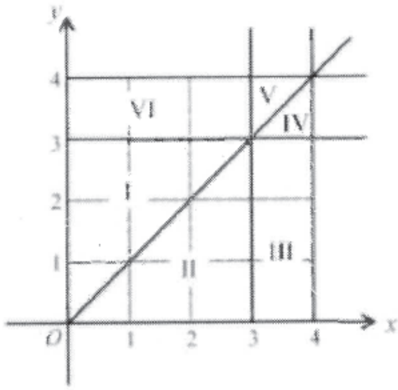
C. $\begin{cases} x + y \ge 6 \\ x \le y \\ x \le 6 \end{cases}$

D. $\begin{cases} x + y \ge 6 \\ x \le y \\ y \le 6 \end{cases}$

E. $\begin{cases} x + y \le 6 \\ x \ge y \\ x \le 6 \end{cases}$

[1997-CE-MATHS 2-9]

14.



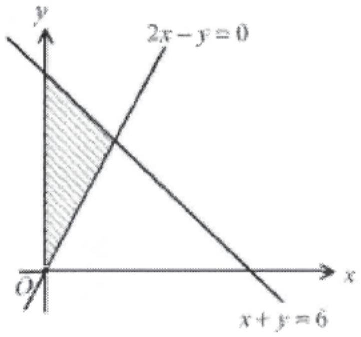
According to the figure, which of the following represents the solution of

$$\begin{cases} 0 \le x \le 4 \\ x \ge y \\ 0 \le y \le 3 \end{cases} ?$$

A. Region I
B. Region II
C. Regions I and VI
D. Regions II and III
E. Regions II, III, IV

[2000-CE-MATHS 2-42]

15.



The shaded region in the figure represents the solution of one of the following systems of inequalities. Which is it?

A. $\begin{cases} 2x - y \le 0 \\ x + y \le 6 \\ x \ge 0 \end{cases}$

B. $\begin{cases} 2x - y \le 0 \\ x + y \le 6 \\ y \ge 0 \end{cases}$

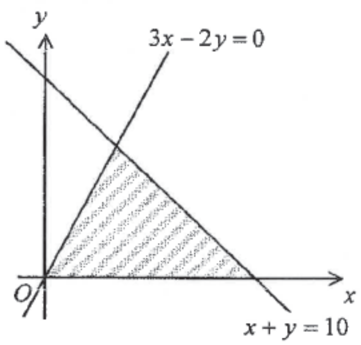
C. $\begin{cases} 2x - y \le 0 \\ x + y \ge 6 \\ y \ge 0 \end{cases}$

D. $\begin{cases} 2x - y \ge 0 \\ x + y \le 6 \\ y \ge 0 \end{cases}$

E. $\begin{cases} 2x - y \ge 0 \\ x + y \ge 6 \\ x \ge 0 \end{cases}$

[2001-CE-MATHS 2-49]

16.



Which of the following systems of inequalities has its solution represented by the shaded region in the figure?

A. $\begin{cases} 3x - 2y \le 0 \\ x + y \ge 10 \\ x \ge 0 \end{cases}$

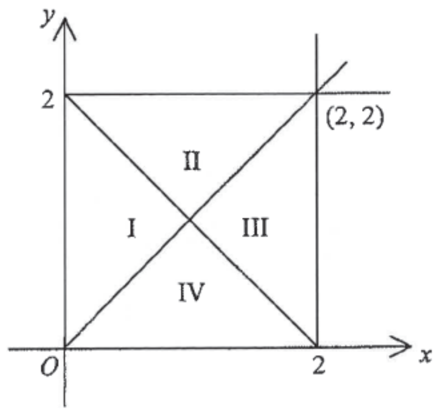
B. $\begin{cases} 3x - 2y \ge 0 \\ x + y \le 10 \\ x \ge 0 \end{cases}$

C. $\begin{cases} 3x - 2y \le 0 \\ x + y \ge 10 \\ y \ge 0 \end{cases}$

D. $\begin{cases} 3x - 2y \ge 0 \\ x + y \le 10 \\ y \ge 0 \end{cases}$

[2003-CE-MATHS 2-43]

17.



Which of the regions in the figure may represent the solution of

$$\begin{cases} x \le 2 \\ x + y \ge 2 \\ x - y \ge 0 \end{cases} ?$$

A. Region I

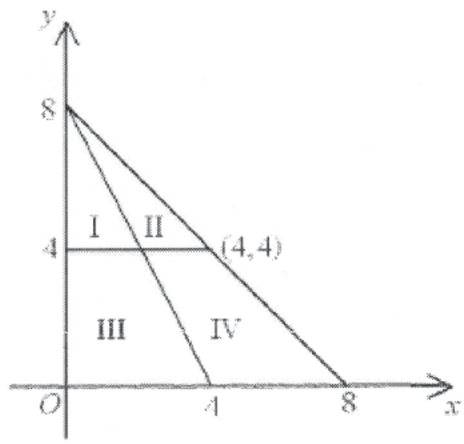
B. Region II

C. Region III

D. Region IV

[2005-CE-MATHS 2-41]

18.



Which of the regions in the figure may represent the solution of

$$\begin{cases} y \ge 4 \\ x + y \le 8 \\ 2x + y \ge 8 \end{cases} ?$$

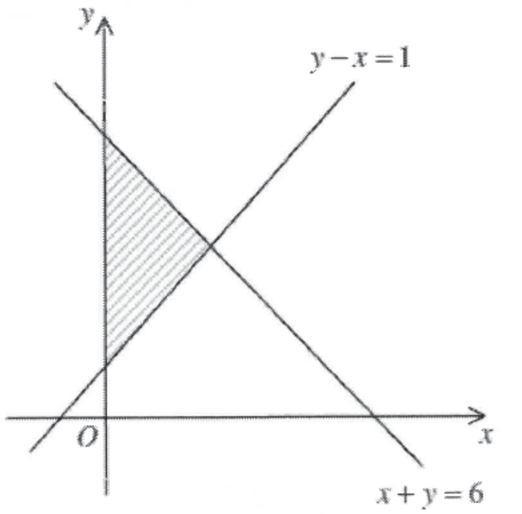
A. Region I

B. Region II

C. Region III

D. Region IV

[2007-CE-MATHS 2-43]

19. 

Which of the following systems of inequalities has its solution represented by the shaded region in the figure?

A. $\begin{cases} y - x \geq 1 \\ x + y \geq 6 \\ x \geq 0 \end{cases}$

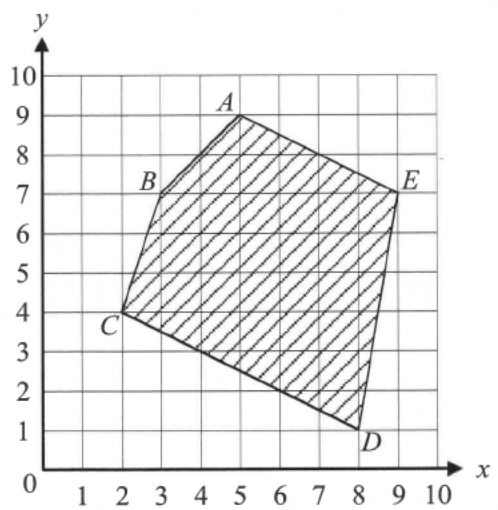
B. $\begin{cases} y - x \geq 1 \\ x + y \leq 6 \\ x \geq 0 \end{cases}$

C. $\begin{cases} y - x \leq 1 \\ x + y \geq 6 \\ y \geq 0 \end{cases}$

D. $\begin{cases} y - x \leq 1 \\ x + y \leq 6 \\ y \geq 0 \end{cases}$

[2011-CE-MATHS 2-43]

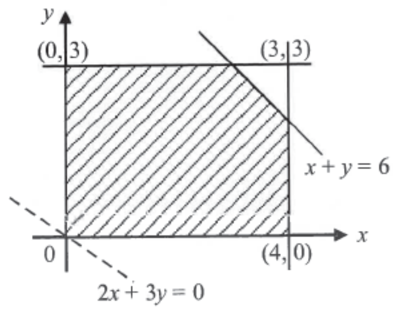
Optimal Solutions

20. 

In the figure, which point in the shaded region will make the value of $x - 2y$ a minimum?

A. A
B. B
C. C
D. D
E. E

[1981-CE-MATHS 2-30]

21. 

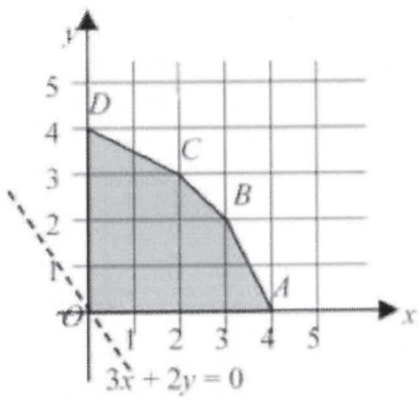
Let $p = 2x + 3y$. Under the following constraints

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ x \leq 4 \\ y \leq 3 \\ x + y \leq 6 \end{cases},$$

what is the greatest value of p?

A. 8
B. 14
C. 15
D. 16
E. 17

[1986-CE-MATHS 2-32]

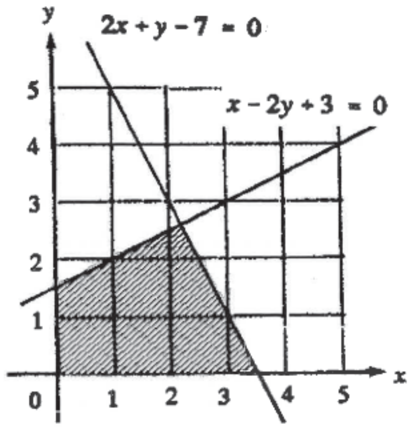
22. 

Find the greatest value of $3x + 2y$ if (x, y) is a point lying in the region $OABCD$ (including the boundary).

A. 15
B. 13
C. 12
D. 9
E. 8

[1993-CE-MATHS 2-6]

23.

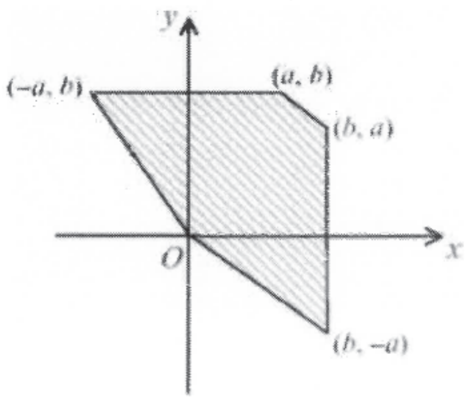


In the figure, (x, y) is a point in the shaded region (including the boundary) and x, y are integers. Find the greatest value of $3x + y$.

A. 7
B. 8
C. 9.2
D. 10
E. 10.5

[1994-CE-MATHS 2-5]

24.

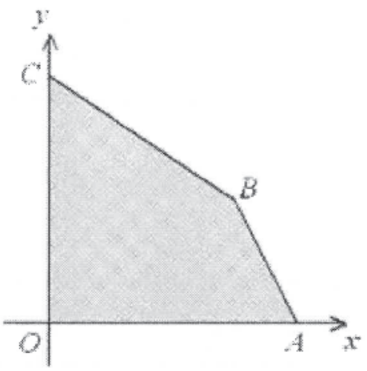


In the figure, find the point (x, y) in the shaded region (including the boundary) at which $bx - ay + 3$ attains its greatest value.

A. (0, 0)
B. $(-a, b)$
C. (a, b)
D. $(b, -a)$
E. (b, a)

[1999-CE-MATHS 2-43]

25.

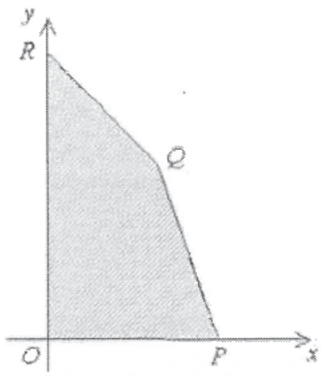


In the figure, O is the origin. The equation of AB is $2x + y - 8 = 0$ and the equation of BC is $2x + 3y - 12 = 0$. If (x, y) is a point lying in the shaded region $OABC$ (including the boundary), then the greatest value of $x + 3y + 4$ is

A. 8 .
B. 13 .
C. 16 .
D. 28 .

[2006-CE-MATHS 2-41]

26.

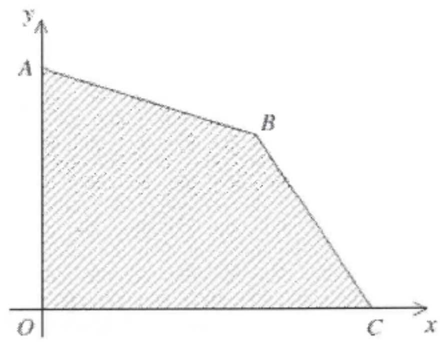


In the figure, the equations of PQ and QR are $3x + y = 36$ and $x + y = 20$ respectively. If (x, y) is a point lying in the shaded region $OPQR$ (including the boundary), then the least value of $2x - 3y + 180$ is

A. 72 .
B. 120 .
C. 160 .
D. 204 .

[2008-CE-MATHS 2-42]

27.

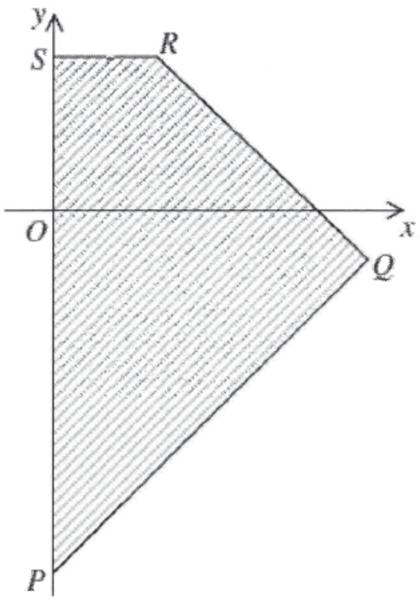


In the figure, the equations of AB and BC are $x + 3y = 18$ and $2x + y = 16$ respectively. If (x, y) is a point lying in the shaded region $OABC$ (including the boundary), then the greatest value of $3x - y + 16$ is

A. 10 .
B. 30 .
C. 40 .
D. 70 .

[2010-CE-MATHS 2-42]

28.



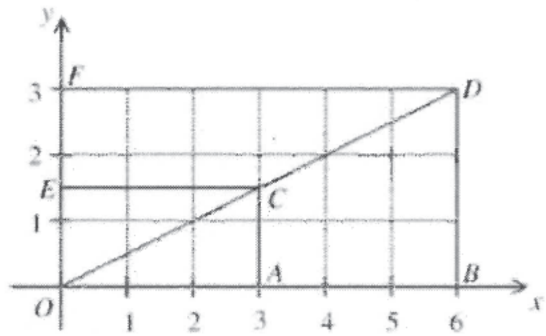
In the figure, the equations of PQ, QR and RS are $x - y = 7$, $x + y = 5$ and $y = 3$ respectively. If (x, y) is a point lying in the shaded region $PQRS$ (including the boundary), at which point does $2x - 3y + 35$ attain its greatest value?

A. P
B. Q
C. R
D. S

[2011-CE-MATHS 2-42]

HKDSE Problems

29.



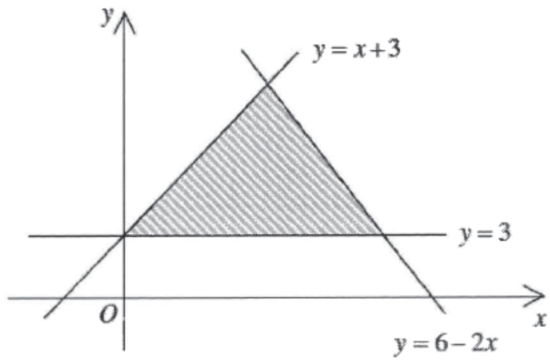
Which of the triangular regions in the figure may represent the solution of

$$\begin{cases} 0 \le x \le 6 \\ 0 \le y \le 3\,? \\ x \le 2y \end{cases}$$

A. ΔOAC
B. ΔOBD
C. ΔOCE
D. ΔODF

[SP-DSE-MATHS 2-35]

30.



The figure shows a shaded region (including the boundary). If (h, k) is a point lying in the shaded region, which of the following are true?

(1) $k \ge 3$
(2) $h - k \ge -3$
(3) $2h + k \le 6$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2012-DSE-MATHS 2-36]

31. Consider the following system of inequalities:

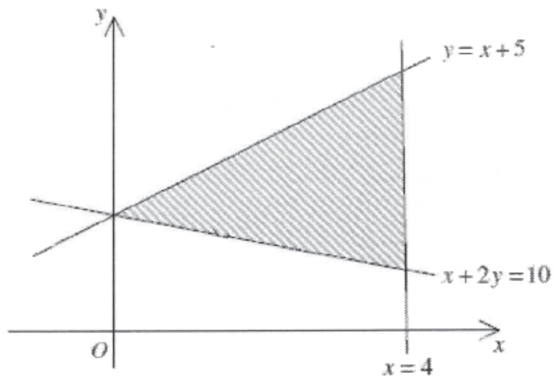
$$\begin{cases} x \ge 2 \\ y \ge 0 \\ x + 4y \le 22 \\ 4x - y \le 20 \end{cases}$$

Let D be the region which represents the solution of the above system of inequalities. If (x, y) is a point lying in D, then the greatest value of $3y - 4x + 15$ is

A. 3 .
B. 17 .
C. 22 .
D. 30 .

[2013-DSE-MATHS 2-37]

32.



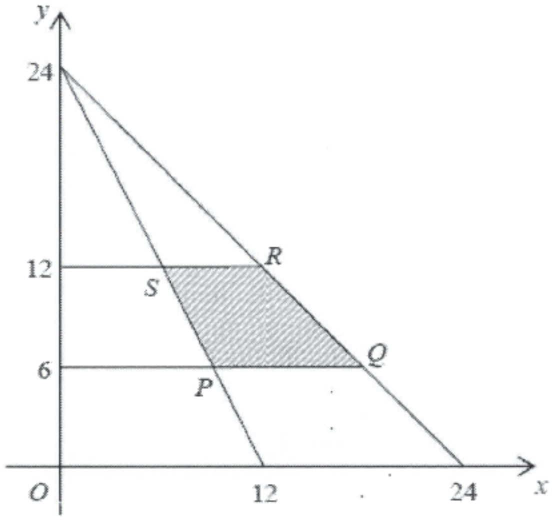
The figure shows a shaded region (including the boundary). If (a, b) is a point lying in the shaded region, which of the following are true?

(1) $a \leq 4$
(2) $a \geq b - 5$
(3) $a \geq 10 - 2b$

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

[2015-DSE-MATHS 2-36]

33.



In the figure, PQ and SR are parallel to the x-axis. If (x, y) is a point lying in the shaded region $PQRS$ (including the boundary), at which point does $7y - 5x + 3$ attain its greatest value?

A. P
B. Q
C. R
D. S

[2016-DSE-MATHS 2-35]

34. Consider the following system of inequalities:

$$\begin{cases} y \leq 9 \\ x - y - 9 \leq 0 \\ x + y - 9 \geq 0 \end{cases}$$

Let R be the region which represents the solution of the above system of inequalities. If (x, y) is a point lying in R, then the greatest value of $x - 2y + 43$ is

A. 25 .
B. 43 .
C. 52 .
D. 61 .

[2017-DSE-MATHS 2-37]

35. Consider the following system of inequalities:

$$\begin{cases} x - 21 \leq 0 \\ x - y - 35 \leq 0 \\ x + 5y - 91 \leq 0 \\ 3x + 2y \geq 0 \end{cases}$$

Let D be the region which represents the solution of the above system of inequalities. If (x, y) is a point lying in D, then the least value of $5x + 6y + 234$ is

A. 45
B. 150
C. 178
D. 423

[2018-DSE-MATHS 2-34]

36. Consider the following system of inequalities:

$$\begin{cases} x + 2y \leq 20 \\ 7x - 6y \leq 20 \\ 13x + 6y \geq 20 \end{cases}$$

Let R be the region which represents the solution of the above system of inequalities. If (x, y) is a point lying in R, then the greatest value of $7x + 8y + 9$ is

A. 15
B. 77
C. 113
D. 115

[2019-DSE-MATHS 2-35]

37. Consider the following system of inequalities:

$$\begin{cases} 0 \leq x \leq 2 \\ 2x + y + 3 \geq 0 \\ x + y + 1 \leq 0 \end{cases}$$

Let D be the region which represents the solution of the above system of inequalities. Find the constant k such that the least value of $4x + 3y + k$ is 24, where (x, y) is a point lying in D.

A. 25
B. 27
C. 37
D. 53

[2020-DSE-MATHS 2-36]