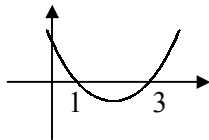


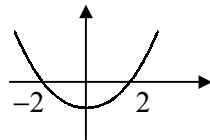
- 1**
- | | | | |
|---------------------------------------|---|--|---|
| a $2x < 6$
$x < 3$ | b $3x \geq 21$
$x \geq 7$ | c $2x > 8$
$x > 4$ | d $3x \leq 36$
$x \leq 12$ |
| e $5x \geq -15$
$x \geq -3$ | f $\frac{1}{3}x < 1$
$x < 3$ | g $9x \geq 54$
$x \geq 6$ | h $3x < -4$
$x < -\frac{4}{3}$ |
| i $x < 14$ | j $4x \leq -10$
$x \leq -\frac{5}{2}$ | k $2 < 3x$
$x > \frac{2}{3}$ | l $5 \geq \frac{1}{2}x$
$x \leq 10$ |

- 2**
- | | | |
|--|---|---|
| a $y > 7$ | b $4p \leq 2$
$p \leq \frac{1}{2}$ | c $6 < 2x$
$x > 3$ |
| d $2a \geq 4$
$a \geq 2$ | e $15 < 3u$
$u > 5$ | f $2b \geq 9$
$b \geq \frac{9}{2}$ |
| g $3x < -18$
$x < -6$ | h $y \geq -13$ | i $-20 \leq 4p$
$p \geq -5$ |
| j $r - 2 > 6$
$r > 8$ | k $3 - 6t \leq t - 4$
$7 \leq 7t$
$t \geq 1$ | l $6 + 2x \geq 24 - 4x$
$6x \geq 18$
$x \geq 3$ |
| m $7y + 21 - 6y + 2 < 0$
$y < -23$ | n $20 - 8x > 21 - 6x$
$-1 > 2x$
$x < -\frac{1}{2}$ | o $12u - 3 - 5u + 15 < 9$
$7u < -3$
$u < -\frac{3}{7}$ |

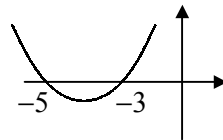
- 3**
- | | | | |
|---------------------------|------------------------------|---------------------------|---|
| a $(x-1)(x-3) < 0$ | b $(x+2)(x-2) \leq 0$ | c $(x+5)(x+3) < 0$ | d $x^2 + 2x - 8 \leq 0$
$(x+4)(x-2) \leq 0$ |
|---------------------------|------------------------------|---------------------------|---|



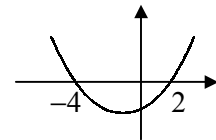
$\therefore 1 < x < 3$



$\therefore -2 \leq x \leq 2$

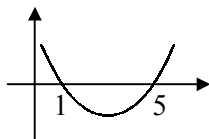


$\therefore -5 < x < -3$

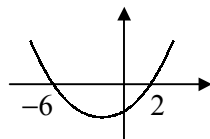


$\therefore -4 \leq x \leq 2$

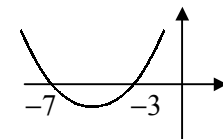
- | | | | |
|---------------------------|--|------------------------------|---|
| e $(x-1)(x-5) > 0$ | f $x^2 + 4x - 12 > 0$
$(x+6)(x-2) > 0$ | g $(x+7)(x+3) \geq 0$ | h $x^2 - 9x - 22 < 0$
$(x+2)(x-11) < 0$ |
|---------------------------|--|------------------------------|---|



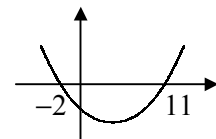
$\therefore x < 1$ or $x > 5$



$\therefore x < -6$ or $x > 2$

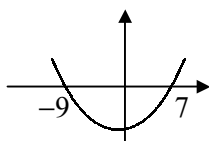


$\therefore x \leq -7$ or $x \geq -3$

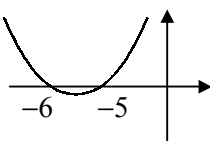


$\therefore -2 < x < 11$

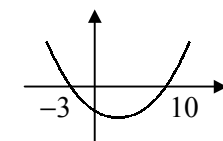
- | | | | |
|--|---------------------------|---|--|
| i $x^2 + 2x - 63 \geq 0$
$(x+9)(x-7) \geq 0$ | j $(x+6)(x+5) > 0$ | k $x^2 - 7x - 30 < 0$
$(x+3)(x-10) < 0$ | l $x^2 - 20x + 91 \geq 0$
$(x-7)(x-13) \geq 0$ |
|--|---------------------------|---|--|



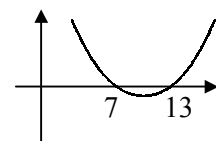
$\therefore x \leq -9$ or $x \geq 7$



$\therefore x < -6$ or $x > -5$

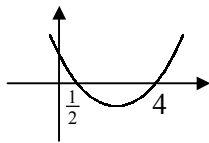


$\therefore -3 < x < 10$



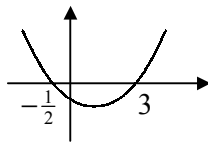
$\therefore x \leq 7$ or $x \geq 13$

4 a $(2x - 1)(x - 4) \leq 0$



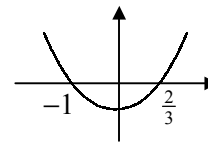
$$\therefore \frac{1}{2} \leq x \leq 4$$

b $(2r + 1)(r - 3) < 0$



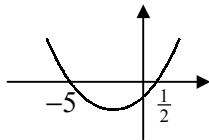
$$\therefore -\frac{1}{2} < r < 3$$

c $3p^2 + p - 2 \leq 0$
 $(3p - 2)(p + 1) \leq 0$



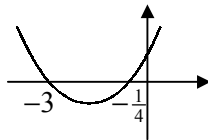
$$\therefore -1 \leq p \leq \frac{2}{3}$$

d $(2y - 1)(y + 5) > 0$



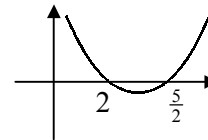
$$\therefore y < -5 \text{ or } y > \frac{1}{2}$$

e $(4m + 1)(m + 3) < 0$



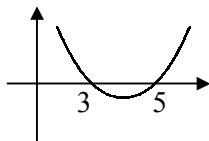
$$\therefore -3 < m < -\frac{1}{4}$$

f $2x^2 - 9x + 10 \geq 0$
 $(2x - 5)(x - 2) \geq 0$



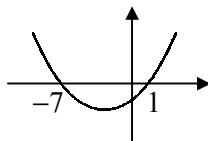
$$\therefore x \leq 2 \text{ or } x \geq \frac{5}{2}$$

g $a^2 - 8a + 15 < 0$
 $(a - 3)(a - 5) < 0$



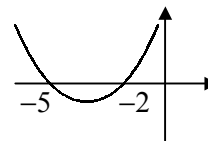
$$\therefore 3 < a < 5$$

h $x^2 + 4x \leq 7 - 2x$
 $x^2 + 6x - 7 \leq 0$
 $(x + 7)(x - 1) \leq 0$



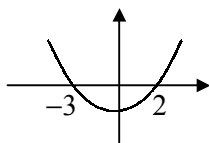
$$\therefore -7 \leq x \leq 1$$

i $y^2 + 9y > 2y - 10$
 $y^2 + 7y + 10 > 0$
 $(y + 5)(y + 2) > 0$



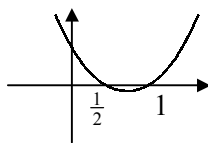
$$\therefore y < -5 \text{ or } y > -2$$

j $2x^2 + x > x^2 + 6$
 $x^2 + x - 6 > 0$
 $(x + 3)(x - 2) < 0$



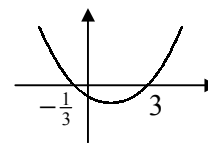
$$\therefore -3 < x < 2$$

k $5u - 6u^2 < 3 - 4u$
 $2u^2 - 3u + 1 > 0$
 $(2u - 1)(u - 1) > 0$



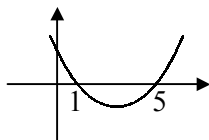
$$\therefore u < \frac{1}{2} \text{ or } u > 1$$

l $2t + 3 \geq 3t^2 - 6t$
 $3t^2 - 8t - 3 \leq 0$
 $(3t + 1)(t - 3) \leq 0$



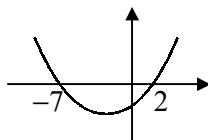
$$\therefore -\frac{1}{3} \leq t \leq 3$$

m $y^2 - 4y + 4 \leq 2y - 1$
 $y^2 - 6y + 5 \leq 0$
 $(y - 1)(y - 5) \leq 0$



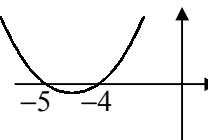
$$\therefore 1 \leq y \leq 5$$

n $p^2 + 5p + 6 \geq 20$
 $p^2 + 5p - 14 \geq 0$
 $(p + 7)(p - 2) \geq 0$



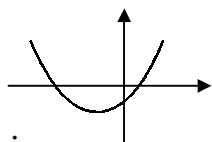
$$\therefore p \leq -7 \text{ or } p \geq 2$$

o $26 + 4x < 6 - 5x - x^2$
 $x^2 + 9x + 20 < 0$
 $(x + 5)(x + 4) < 0$

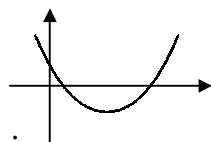


$$\therefore -5 < x < -4$$

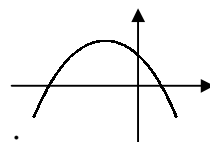
- 5 a for critical values $x = \frac{-2 \pm \sqrt{4+4}}{2}$
 $x = \frac{-2 \pm 2\sqrt{2}}{2}$
 $x = -1 \pm \sqrt{2}$
- b for critical values $x = \frac{6 \pm \sqrt{36-16}}{2}$
 $x = \frac{6 \pm 2\sqrt{5}}{2}$
 $x = 3 \pm \sqrt{5}$
- c for critical values $x = \frac{6 \pm \sqrt{36+44}}{-2}$
 $x = \frac{6 \pm 4\sqrt{5}}{-2}$
 $x = -3 \pm 2\sqrt{5}$
- d for critical values $x = \frac{-4 \pm \sqrt{16-4}}{2}$
 $x = \frac{-4 \pm 2\sqrt{3}}{2}$
 $x = -2 \pm \sqrt{3}$



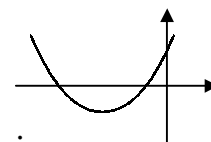
$$\therefore -1 - \sqrt{2} < x < -1 + \sqrt{2}$$



$$\therefore x < 3 - \sqrt{5} \text{ or } x > 3 + \sqrt{5}$$



$$\therefore -3 - 2\sqrt{5} < x < -3 + 2\sqrt{5}$$

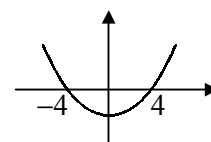


$$\therefore x \leq -2 - \sqrt{3} \text{ or } x \geq -2 + \sqrt{3}$$

- 6 a equal roots
 $\therefore b^2 - 4ac = 0$
 $36 - 4k = 0$
 $k = 9$
- b real and distinct roots
 $\therefore b^2 - 4ac > 0$
 $4 - 4k > 0$
 $4 > 4k$
 $k < 1$

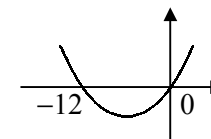
- c no real roots
 $\therefore b^2 - 4ac < 0$
 $9 - 4k < 0$
 $9 < 4k$
 $k > \frac{9}{4}$

- d real roots
 $\therefore b^2 - 4ac \geq 0$
 $k^2 - 16 \geq 0$
 $(k+4)(k-4) \geq 0$
 $k \leq -4 \text{ or } k \geq 4$



- e equal roots
 $\therefore b^2 - 4ac = 0$
 $1 + 4k = 0$
 $k = -\frac{1}{4}$

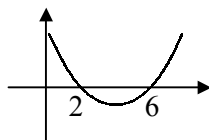
- f no real roots
 $\therefore b^2 - 4ac < 0$
 $k^2 + 12k < 0$
 $k(k+12) < 0$
 $-12 < k < 0$



- g real and distinct roots
 $\therefore b^2 - 4ac > 0$
 $4 - 4(k-2) > 0$
 $12 > 4k$
 $k < 3$

- h equal roots
 $\therefore b^2 - 4ac = 0$
 $k^2 - 8k = 0$
 $k(k-8) = 0$
 $k = 0 \text{ or } 8$

- i no real roots
 $\therefore b^2 - 4ac < 0$
 $k^2 - 4(2k-3) < 0$
 $k^2 - 8k + 12 < 0$
 $(k-2)(k-6) < 0$
 $2 < k < 6$



- j real roots
 $\therefore b^2 - 4ac \geq 0$
 $(k-1)^2 - 36 \geq 0$
 $k^2 - 2k - 35 \geq 0$
 $(k+5)(k-7) \geq 0$
 $k \leq -5 \text{ or } k \geq 7$

