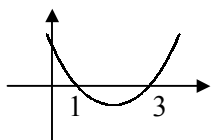


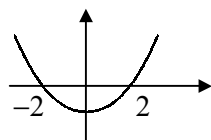
- 1    **a**  $2x < 6$   
 $x < 3$                       **b**  $3x \geq 21$   
 $x \geq 7$                       **c**  $2x > 8$   
 $x > 4$                       **d**  $3x \leq 36$   
 $x \leq 12$
- e**  $5x \geq -15$                       **f**  $\frac{1}{3}x < 1$                       **g**  $9x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

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

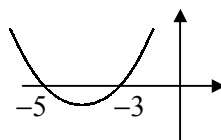
- 3    **a**  $(x-1)(x-3) < 0$     **b**  $(x+2)(x-2) \leq 0$     **c**  $(x+5)(x+3) < 0$     **d**  $x^2 + 2x - 8 \leq 0$   
 $(x+4)(x-2) \leq 0$



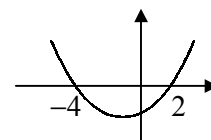
$\therefore 1 < x < 3$



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

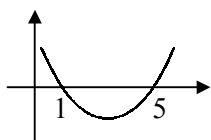


$\therefore -5 < x < -3$

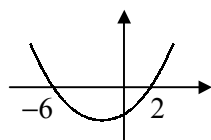


$\therefore -4 \leq x \leq 2$

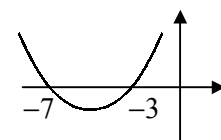
- e**  $(x-1)(x-5) > 0$     **f**  $x^2 + 4x - 12 > 0$   
 $(x+6)(x-2) > 0$     **g**  $(x+7)(x+3) \geq 0$     **h**  $x^2 - 9x - 22 < 0$   
 $(x+2)(x-11) < 0$



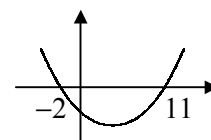
$\therefore x < 1$  or  $x > 5$



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

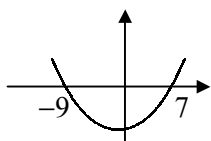


$\therefore x \leq -7$  or  $x \geq -3$

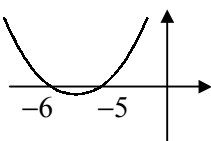


$\therefore -2 < x < 11$

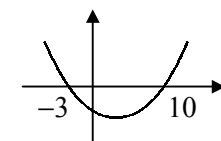
- i**  $x^2 + 2x - 63 \geq 0$   
 $(x+9)(x-7) \geq 0$     **j**  $(x+6)(x+5) > 0$     **k**  $x^2 - 7x - 30 < 0$   
 $(x+3)(x-10) < 0$     **l**  $x^2 - 20x + 91 \geq 0$   
 $(x-7)(x-13) \geq 0$



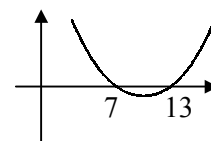
$\therefore x \leq -9$  or  $x \geq 7$



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

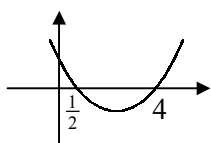


$\therefore -3 < x < 10$



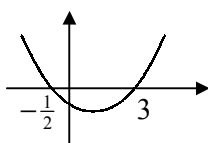
$\therefore x \leq 7$  or  $x \geq 13$

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



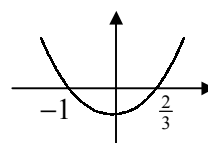
$$\therefore \frac{1}{2} \leq x \leq 4$$

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



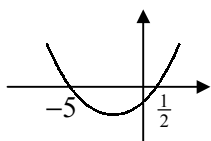
$$\therefore -\frac{1}{2} < r < 3$$

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



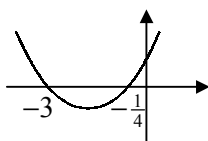
$$\therefore -1 \leq p \leq \frac{2}{3}$$

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



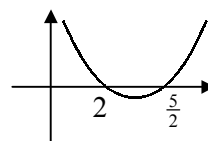
$$\therefore y < -5 \text{ or } y > \frac{1}{2}$$

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



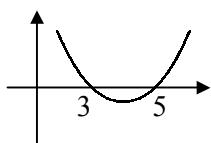
$$\therefore -3 < m < -\frac{1}{4}$$

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



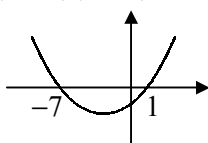
$$\therefore x \leq 2 \text{ or } x \geq \frac{5}{2}$$

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



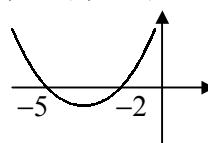
$$\therefore 3 < a < 5$$

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



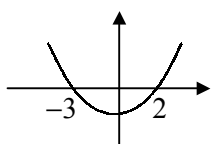
$$\therefore -7 \leq x \leq 1$$

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



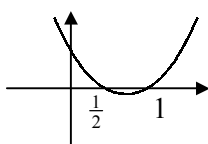
$$\therefore y < -5 \text{ or } y > -2$$

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



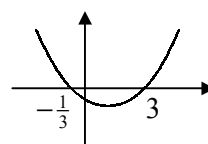
$$\therefore -3 < x < 2$$

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



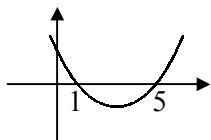
$$\therefore u < \frac{1}{2} \text{ or } u > 1$$

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



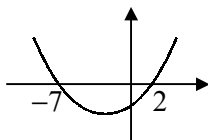
$$\therefore -\frac{1}{3} \leq t \leq 3$$

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



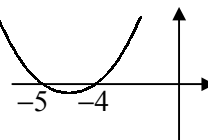
$$\therefore 1 \leq y \leq 5$$

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



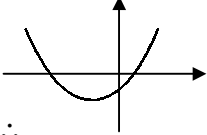
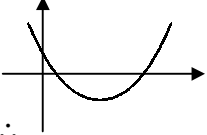
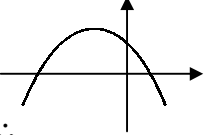
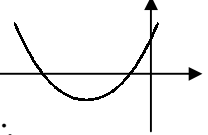
$$\therefore p \leq -7 \text{ or } p \geq 2$$

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



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

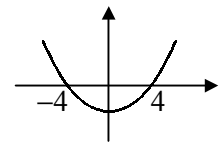
**5**

<p><b>a</b> for critical values</p> $x = \frac{-2 \pm \sqrt{4+4}}{2}$ $x = \frac{-2 \pm 2\sqrt{2}}{2}$ $x = -1 \pm \sqrt{2}$  <p><math>\therefore -1 - \sqrt{2} &lt; x &lt; -1 + \sqrt{2}</math></p>	<p><b>b</b> for critical values</p> $x = \frac{6 \pm \sqrt{36-16}}{2}$ $x = \frac{6 \pm 2\sqrt{5}}{2}$ $x = 3 \pm \sqrt{5}$  <p><math>\therefore x &lt; 3 - \sqrt{5}</math> or <math>x &gt; 3 + \sqrt{5}</math></p>	<p><b>c</b> for critical values</p> $x = \frac{6 \pm \sqrt{36+44}}{-2}$ $x = \frac{6 \pm 4\sqrt{5}}{-2}$ $x = -3 \pm 2\sqrt{5}$  <p><math>\therefore -3 - 2\sqrt{5} &lt; x &lt; -3 + 2\sqrt{5}</math></p>	<p><b>d</b> for critical values</p> $x = \frac{-4 \pm \sqrt{16-4}}{2}$ $x = \frac{-4 \pm 2\sqrt{3}}{2}$ $x = -2 \pm \sqrt{3}$  <p><math>\therefore x \leq -2 - \sqrt{3}</math> or <math>x \geq -2 + \sqrt{3}</math></p>
---	--	---	--

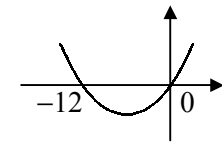
**6**

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

<p><b>c</b> no real roots</p> $\therefore b^2 - 4ac < 0$ $9 - 4k < 0$ $9 < 4k$ $k > \frac{9}{4}$	<p><b>d</b> real roots</p> $\therefore b^2 - 4ac \geq 0$ $k^2 - 16 \geq 0$ $(k+4)(k-4) \geq 0$ $k \leq -4 \text{ or } k \geq 4$
--	---



<p><b>e</b> equal roots</p> $\therefore b^2 - 4ac = 0$ $1 + 4k = 0$ $k = -\frac{1}{4}$	<p><b>f</b> no real roots</p> $\therefore b^2 - 4ac < 0$ $k^2 + 12k < 0$ $k(k+12) < 0$ $-12 < k < 0$
--	--



<p><b>g</b> real and distinct roots</p> $\therefore b^2 - 4ac > 0$ $4 - 4(k-2) > 0$ $12 > 4k$ $k < 3$	<p><b>h</b> equal roots</p> $\therefore b^2 - 4ac = 0$ $k^2 - 8k = 0$ $k(k-8) = 0$ $k = 0 \text{ or } 8$
---	--

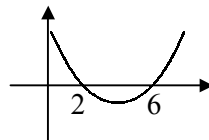
**i** no real roots

$$\therefore b^2 - 4ac < 0$$

$$k^2 - 4(2k-3) < 0$$

$$k^2 - 8k + 12 < 0$$

$$(k-2)(k-6) < 0$$

$$2 < k < 6$$


**j** real roots

$$\therefore b^2 - 4ac \geq 0$$

$$(k-1)^2 - 36 \geq 0$$

$$k^2 - 2k - 35 \geq 0$$

$$(k+5)(k-7) \geq 0$$

$$k \leq -5 \text{ or } k \geq 7$$
