

Exercise 8.5

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1. Write the discriminant of the following quadratic equations:

(i) $2x^2 - 5x + 3 = 0$

Solution:

Given equation,

$$2x^2 - 5x + 3 = 0$$

It is in the form of $ax^2 + bx + c = 0$

Where, $a = 2$, $b = -5$ and $c = 3$

So, the discriminant is given by $D = b^2 - 4ac$

$$D = (-5)^2 - 4 \times 2 \times 3$$

$$D = 25 - 24 = 1$$

Hence, the discriminant of the given quadratic equation is 1.

(ii) $x^2 + 2x + 4 = 0$

Solution:

Given equation,

$$x^2 + 2x + 4 = 0$$

It is in the form of $ax^2 + bx + c = 0$

Where, $a = 1$, $b = 2$ and $c = 4$

So, the discriminant is given by $D = b^2 - 4ac$

$$D = (2)^2 - 4 \times 1 \times 4$$

$$D = 4 - 16 = -12$$

Hence, the discriminant of the given quadratic equation is -12.

(iii) $(x - 1)(2x - 1) = 0$

Solution:

Given equation,

$$(x - 1)(2x - 1) = 0$$

On expanding it, we get

$$2x^2 - 3x + 1 = 0$$

It is in the form of $ax^2 + bx + c = 0$

Where, $a = 2$, $b = -3$, $c = 1$

So, the discriminant is given by $D = b^2 - 4ac$

$$D = (-3)^2 - 4 \times 2 \times 1$$

$$D = 9 - 8 = 1$$

Hence, the discriminant of the given quadratic equation is 1.

(iv) $x^2 - 2x + k = 0$, $k \in \mathbb{R}$

Solution:

Given equation,

$$x^2 - 2x + k = 0$$

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It is in the form of $ax^2 + bx + c = 0$

Where, $a = 1$, $b = -2$, and $c = k$

So, the discriminant is given by $D = b^2 - 4ac$

$$\begin{aligned} D &= (-2)^2 - 4(1)(k) \\ &= 4 - 4k \end{aligned}$$

Hence, the discriminant of the given equation is $(4 - 4k)$.

(v) $\sqrt{3}x^2 + 2\sqrt{2}x - 2\sqrt{3} = 0$

Solution:

Given equation,

$$\sqrt{3}x^2 + 2\sqrt{2}x - 2\sqrt{3} = 0$$

It is in the form of $ax^2 + bx + c = 0$

Here $a = \sqrt{3}$, $b = 2\sqrt{2}x$ and $c = -2\sqrt{3}$

So, the discriminant is given by $D = b^2 - 4ac$

$$= (2\sqrt{2})^2 - (4 \times \sqrt{3} \times -2\sqrt{3})$$

$$D = 8 + 24 = 32$$

Thus, the discriminant of the given equation is 32.

(vi) $x^2 - x + 1 = 0$

Solution:

Given equation,

$x^2 - x + 1 = 0$ It is in the form of $ax^2 + bx + c = 0$

Where, $a = 1$, $b = -1$ and $c = 1$

So, the discriminant is given by $D = b^2 - 4ac$

$$D = (-1)^2 - 4 \times 1 \times 1$$

$$D = 1 - 4 = -3$$

Thus, the discriminant of the given equation is -3.