Lecture 4

Module 13

Q. Find the zeroes of the following quadratics Polynomials.

(1) $m^2 - 84$

Sol. $m^2 - 84$

$= (m)^2 - (\sqrt{84})^2$ $a^2 - b^2 = (a + b)(a - b)$

$= (m + \sqrt{84})(m - \sqrt{84})$

$\therefore$ $(m + \sqrt{84})$ and $(m - \sqrt{84})$ are the factors of $m^2 - 84$

So, the value of $m^2 - 84$ is zero

When $(m + \sqrt{84}) = 0$ or $(m - \sqrt{84}) = 0$

$\therefore$ $m + \sqrt{84} = 0$ or $m - \sqrt{84} = 0$

$\therefore$ $m = -\sqrt{84}$ or $m = \sqrt{84}$

$\therefore$ $m = -2\sqrt{21}$ or $m = 2\sqrt{21}$

$\therefore$ $\boxed{\text{The zeroes of } m^2 - 84 \text{ are } 2\sqrt{21} \text{ or } -2\sqrt{21}.}$

2	84
2	42
3	21
7	7
	1

Q. Find the zeroes of the following quadratics Polynomials.

(2) $x^2 + 21x - 196$

Sol.

$$x^2 + 21x - 196$$

$$= x^2 + (28x - 7x) - 196$$

$$= \underline{x^2 + 28x} - \underline{7x - 196}$$

$$= x(x + 28) - 7(x + 28)$$

$$= (x + 28)(x - 7)$$

$\therefore$ $(x + 28)$ and $(x - 7)$ are the factors of $x^2 + 21x - 196$

So, the value of $x^2 + 21x - 196$ is zero

When $(x + 28) = 0$ or $(x - 7) = 0$

$\therefore$ $x + 28 = 0$ or $x - 7 = 0$

$\therefore$ $x = -28$ or $x = 7$

$\therefore$ $\boxed{\text{The zeroes of } x^2 + 21x - 196 \text{ are } -28 \text{ and } 7.}$

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$28x - 7x = 21x$

Module 14

Q. Find the zeroes of the following quadratics Polynomials.

(1) $7x^2 + 4x - 20$

Sol.

$7x^2 + 4x - 20$

$= 7x^2 + (14x - 10x) - 20$

$= \underline{7x^2 + 14x} - \underline{10x - 20}$

$= 7x(x + 2) - 10(x + 2)$

$= (x + 2)(7x - 10)$

$\therefore$ $\underline{(x + 2)}$ and $\underline{(7x - 10)}$ are the factors of $7x^2 + 4x - 20$

So, the value of $7x^2 + 4x - 20$ is zero

When $(x + 2) = 0$ or $(7x - 10) = 0$

$\therefore$ $x + 2 = 0$ or $7x - 10 = 0$

$\therefore$ $x = -2$ or $7x = 10$

$\therefore$ $x = -2$ or $x = \dfrac{10}{7}$

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$14x - 10x = 4x$

$\therefore$ $\boxed{\text{The zeroes of } 7x^2 + 4x - 20 \text{ are } -2 \text{ and } \dfrac{10}{7}}$

Q. Find the zeroes of the following quadratics Polynomials.

(2) $7m^2 - 84$

Sol. $7m^2 - 84$

$= 7(m^2 - 12)$ $\quad\quad a^2 - b^2 = (a + b)(a - b)$

$= 7\left[(m^2) - (\sqrt{12})^2\right]$

$= 7(m + \sqrt{12})(m - \sqrt{12})$

$\therefore (m + \sqrt{12})(m - \sqrt{12})$

$\therefore$ 7, $(m + \sqrt{12})$ and $(m - \sqrt{12})$ are the factors of $7m^2 - 84$

So, the value of $7m^2 - 84$ is zero

When $(m + \sqrt{12}) = 0$ or $(m - \sqrt{12}) = 0$

$\therefore$ $m = -\sqrt{12}$ or $m = \sqrt{12}$

$\therefore$ $\boxed{\text{The zeroes of } 7m^2 - 84 \text{ are } -2\sqrt{3} \text{ or } 2\sqrt{3}.}$

2	12
2	6
3	3
	1

Module 15

Standard form of Polynomials in terms of a and b

x^2 – (Sum of roots)x + Product of roots

$x^2 - (a + b)x + ab$

Exercise 2.2

Q. 2 Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively :

(iii) $0, \sqrt{5}$

Sol. Let quadratic polynomial be $ax^2 + bx + c$, and its two zeroes be α and β

We have $\alpha + \beta = 0$ and $\alpha\beta = \sqrt{5}$

$$\frac{-b}{a} = \frac{0}{1} \qquad \frac{c}{a} = \frac{\sqrt{5}}{1}$$

If $a = 1$, then $b = 0$ and $c = \sqrt{5}$

So, one quadratic polynomial which fits the given condition is $x^2 - 0x + \sqrt{5}$ i.e $x^2 + \sqrt{5}$

EXERCISE 2.2

Q. 2 Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively :

(iv) 1, 1

Sol. Let quadratic polynomial be $ax^2 + bx + c$, and its two zeroes be α and β

We have $\alpha + \beta = 1$ and $\alpha\beta = 1$

$\frac{-b}{a} = \frac{1}{1}$ $\qquad$ $\frac{c}{a} = \frac{1}{1}$

If $a = 1$, then $b = -1$ and $c = 1$

So, one quadratic polynomial which fits the given condition is $x^2 - x + 1$

Module 16

EXERCISE 2.2

Q. 2 Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively :

(i) $\frac{1}{4}$, -1

Sol. Let quadratic polynomial be $ax^2 + bx + c$, and its two zeroes be α and β

We have $\alpha + \beta = \frac{1}{4}$ and $\alpha\beta = -1$

$\frac{-b}{a} = \frac{1}{4}$

$\frac{c}{a} = \frac{-1}{1} \times \frac{4}{4} = \frac{-4}{4}$

If $a = 4$, then $b = -1$ and $c = -4$

So, one quadratic polynomial which fits the given condition is $4x^2 - x - 4$

EXERCISE 2.2

Q. 2 **Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively :**

(ii) $\sqrt{2}$, $\frac{1}{3}$

Sol. Let quadratic polynomial be $ax^2 + bx + c$, and its two zeroes be α and β

We have $\alpha + \beta = \sqrt{2}$ and $\alpha\beta = \frac{1}{3}$

$$\frac{-b}{a} = \frac{\sqrt{2}}{1} \frac{\times 3}{\times 3} = \frac{3\sqrt{2}}{3} \qquad \frac{c}{a} = \frac{1}{3}$$

If $a = 3$, then $b = 3\sqrt{2}$ and $c = 1$

So, one quadratic polynomial which fits the given condition is $3x^2 - 3\sqrt{2}x + 1$

EXERCISE 2.2

Q. 2 Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively :

(v) $\frac{-1}{4}, \frac{1}{4}$

Sol. Let quadratic polynomial be $ax^2 + bx + c$, and its two zeroes be α and β

We have $\alpha + \beta = \frac{-1}{4}$ and $\alpha\beta = \frac{1}{4}$

$\frac{-b}{a} = \frac{-1}{4}$ $\qquad$ $\frac{c}{a} = \frac{1}{4}$

If $a = 4$, then $b = 1$ and $c = 1$

So, one quadratic polynomial which fits the given condition is $4x^2 + x + 1$

Exercise 2.2

Q. 2 Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively :

(vi) 4, 1

Sol. Let quadratic polynomial be $ax^2 + bx + c$, and its two zeroes be α and β

We have $\alpha + \beta = 4$ and $\alpha\beta = 1$

$\frac{-b}{a} = \frac{4}{1}$ $\frac{c}{a} = \frac{1}{1}$

If $a = 1$, then $b = -4$ and $c = 1$

So, one quadratic polynomial which fits the given condition is $x^2 - 4x + 1$

Thank You