Lecture 2

Module 05

Exercise 2.2

Q. 1 Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients :

(ii) $4s^2 - 4s + 1$

Sol. $4s^2 - 4s + 1$

$= 4s^2 - 2s - 2s + 1$ $\quad 4 \times 1 = 4$

4

$-2 + -2 = 4$

$= 2s(2s - 1) - 1(2s - 1)$

$= (2s - 1)(2s - 1)$

$\therefore$ $(2s - 1)$ and $(2s - 1)$ are the factors of $4s^2 - 4s + 1$

So, the value of $4s^2 - 4s + 1$ is zero,

When $(2s - 1) = 0$ or $(2s - 1) = 0$

i.e. $s = \dfrac{1}{2}$ or $s = \dfrac{1}{2}$

Therefore, the zeroes of $4s^2 - 4s + 1$ are $\dfrac{1}{2}$ and $\dfrac{1}{2}$

Now, Sum of zeroes $= \dfrac{1}{2} + \dfrac{1}{2} = 1$ ...(i)

$\alpha + \beta = \dfrac{-(\text{coefficient of } s)}{\text{coefficient of } s^2}$

$= \dfrac{-(-4)}{4}$

$= 1$ ...(ii)

Hence verified from (i) and (ii)

Product of zeroes $= \dfrac{1}{2} \times \dfrac{1}{2} = \dfrac{1}{4}$ ...(iii)

$\alpha \times \beta = \dfrac{\text{constant term}}{\text{coefficient of } s^2}$

$= \dfrac{1}{4}$ ...(iv)

Hence verified (iii) and (iv)

Module 06

EXERCISE 2.2

Q. 1 Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients :

(iv) $\boxed{4}u^2 \boxed{+8}u$

Sol. $\boxed{}4u^2 + \boxed{8u}$

$= 4u(u+2)$

$\therefore$ $4u$ and $(u + 2)$ are the factors of $4u^2 + 8u$

So, the value of $4u^2 + 8u$ is zero,

When $4u = 0$ or $u + 2 = 0$,

i.e. when $u = 0$ or $u = -2$.

Therefore, the zeroes of $4u^2 + 8u$ are 0 and -2.

Sum of zeroes $= 0 + (-2) = -2$ ....(i)

We know, $\alpha + \beta = \dfrac{-(\text{coefficient of } u)}{\text{coefficient of } u^2}$

$= \dfrac{-(8)}{4} = -2$ ....(ii)

Hence verified from (i) and (ii)

Product of zeroes $= 0 \times (-2) = 0$ ...(iii)

We know, $\alpha \times \beta = \dfrac{\text{constant term}}{\text{coefficient of } u^2}$

$= \dfrac{0}{4}$

$= 0$ ...(iv)

Hence verified from (iii) and (iv)

EXERCISE 2.2

Q. 1 Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients :

(v) $t^2 - 15$

$(t)^2 = t^2$ $(\sqrt{15})^2 = 15$

Sol. $\boxed{1}\boxed{t^2}\boxed{-15}$

$= \underset{a^2}{(t)^2} - \underset{b^2}{(\sqrt{15})^2}$

$= (t + \sqrt{15})(t - \sqrt{15})$

[using $a^2 - b^2 = (a + b)(a - b)$]

$\therefore$ $(t + \sqrt{15})$ and $(t - \sqrt{15})$ are the factors of $t^2 - 15$

So, the value of $t^2 - 15$ is zero,

When $(t + \sqrt{15}) = 0$ or $(t - \sqrt{15}) = 0$,

i.e. when $t = -\sqrt{15}$ or $t = \sqrt{15}$.

Therefore, the zeroes of $t^2 - 15$ are $-\sqrt{15}$ and $\sqrt{15}$

Now, Sum of zeroes $= \cancel{-\sqrt{15}} + \cancel{\sqrt{15}} = 0$ ...(i)

$\alpha + \beta = \dfrac{-(\text{coefficient of } t)}{\text{coefficient of } t^2}$

$= \dfrac{-(0)}{1} = 0$ ...(ii)

Hence verified from (i) and (ii)

Product of zeroes $= -\sqrt{15} \times \sqrt{15} = -15$ ..(iii)

$\alpha \times \beta = \dfrac{\text{constant term}}{\text{coefficient of } t^2}$

$= \dfrac{-15}{1} = -15$ ...(iv)

Hence verified from (iii) and (iv)

Module 07

Exercise 2.2

Q. 1 Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients :

(iii) $6x^2 - 3 - 7x$

Sol. $\boxed{6}x^2 \; - \boxed{7}x \; - \boxed{3}$

$= \underline{6x^2 - 9x} + \underline{2x - 3}$

$= 3x\,\underline{(2x - 3)} + 1\,\underline{(2x - 3)}$

$= (2x - 3)\,(3x + 1)$

$\therefore$ $(2x - 3)$ and $(3x + 1)$ are the factors of $6x^2 - 3 - 7x$

So, the value of $6x^2 - 3 - 7x$ is zero,

When $(2x - 3) = 0$ or $(3x + 1) = 0$,

$\therefore$ $2x - 3 = 0$ or $3x + 1 = 0$

$\therefore$ $x = \dfrac{3}{2}$ or $x = \dfrac{-1}{3}$

$\therefore$ The zeroes are $\dfrac{3}{2}$ and $\dfrac{-1}{3}$.

Now, Sum of zeroes $= \dfrac{3}{2} + \left(\dfrac{-1}{3}\right)$

18

6   3

+ 2   − 9

$3 \times 6 = 18$

Sum of zeroes $= \dfrac{9}{6} - \dfrac{2}{6}$

$= \dfrac{7}{6}$ ...(i)

$6 - 3 \neq 7$

$9 - 2 = 7$

We know, $\alpha + \beta = \dfrac{-(\text{coefficient of } x)}{\text{coefficient of } x^2}$

$= \dfrac{-(-7)}{6} = \dfrac{7}{6}$ ... (ii)

Hence verified from (i) and (ii)

Product of zeroes $= \dfrac{\cancel{3}}{2} \times \dfrac{-1}{\cancel{3}} = \dfrac{-1}{2}$ ...(iii)

We know, $(\alpha \times \beta) = \dfrac{\text{Constant term}}{\text{coefficient of } x^2}$

$= \dfrac{\cancel{-3}^{\,1}}{\cancel{6}_{\,2}} = \dfrac{-1}{2}$ ...(iv)

Hence verified from (iii) and (iv)

EXERCISE 2.2

Q. 1 Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients :

(vi) $3x^2 - x - 4$

12

+3 −4

Sol : $\boxed{3}x^2 \boxed{-1}x \boxed{-} \boxed{4}$

$= 3x^2 + 3x - 4x - 4$

$-x = 3x - 4x$ $\quad 3 \times 4 = 12$

$= 3x(x + 1) - 4(x + 1)$

$3 - 4 = -1$

$= (x + 1)(3x - 4)$

$\therefore$ $(x + 1)$ and $(3x - 4)$ are the factors of $3x^2 - x - 4$

So, the value of $3x^2 - x - 4$ is zero,

When $(x + 1) = 0$ or $(3x - 4) = 0$,

$\therefore \quad x + 1 = 0$ or $3x - 4 = 0$

$\therefore \quad x = -1$ or $x = \frac{4}{3}$

$\therefore$ The zeroes are -1 and $\frac{4}{3}$.

Now, Sum of zeroes $= -1 + \frac{4}{3}$

$\therefore$ Sum of zeroes $= \frac{-3 + 4}{3}$

$= \frac{1}{3}$ ...(i)

We know, $\alpha + \beta = \frac{-(\text{coefficient of } x)}{\text{coefficient of } x^2}$

$= \frac{-(-1)}{3} = \frac{1}{3}$ ...(ii)

Hence verified from (i) and (ii)

Product of zeroes $= -1 \times \frac{4}{3} = \frac{-4}{3}$ ...(iii)

We know, $(\alpha \times \beta) = \frac{\text{Constant term}}{\text{coefficient of } x^2}$

$= \frac{-4}{3}$ ...(iv)

Hence verified from (iii) and (iv)

Thank You