Exercise 2.2 Page: 33

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

Solutions:

(i)x^2–2x –8

⇒x^2– 4x+2x–8 = x(x–4)+2(x–4) = (x-4)(x+2)

Therefore, zeroes of polynomial equation x^2–2x–8 are (4, -2)

Sum of zeroes = 4–2 = 2 = -(-2)/1 = -(Coefficient of x)/(Coefficient of x^2)

Product of zeroes = 4×(-2) = -8 =-(8)/1 = (Constant term)/(Coefficient of x^2)

(ii)$4s^2$–4s+1

⇒$4s^2$–2s–2s+1 = 2s(2s–1)–1(2s-1) = (2s–1)(2s–1)

Therefore, zeroes of polynomial equation $4s^2$–4s+1 are (1/2, 1/2)

Sum of zeroes = (½)+(1/2) = 1 = -(-4)/4 = -(Coefficient of s)/(Coefficient of

s^2) Product of zeros = (1/2)×(1/2) = 1/4 = (Constant term)/(Coefficient of

s^2)

(iii) $6x^2$–3–7x

⇒$6x^2$–7x–3 = $6x^2$ – 9x + 2x – 3 = 3x(2x - 3) +1(2x - 3) = (3x+1)(2x-3)

Therefore, zeroes of polynomial equation $6x^2$–3–7x are (-1/3, 3/2)

Sum of zeroes = -(1/3)+(3/2) = (7/6) = -(Coefficient of x)/(Coefficient of x^2)

Product of zeroes = -(1/3)×(3/2) = -(3/6) = (Constant term) /(Coefficient of x^2)

(iv)$4u^2$+8u

⇒ 4u(u+2)

Therefore, zeroes of polynomial equation $4u^2$ + 8u are (0, -2).

Sum of zeroes = 0+(-2) = -2 = -(8/4) = = -(Coefficient of u)/(Coefficient of u^2)

Product of zeroes = 0×-2 = 0 = 0/4 = (Constant term)/(Coefficient of u^2)

(v) t^2–15

⇒ $t^2 = 15$ or $t = \pm\sqrt{15}$
Therefore, zeroes of polynomial equation t^2 –15 are ($\sqrt{15}$, -$\sqrt{15}$)

Sum of zeroes =$\sqrt{15}$+(-$\sqrt{15}$) = 0= -(0/1)= -(Coefficient of t) / (Coefficient of t^2)

Product of zeroes = $\sqrt{15}$×(-$\sqrt{15}$) = -15 = -15/1 = (Constant term) / (Coefficient of t^2)

(vi) $3x^2$–x–4

⇒ $3x^2$–4x+3x–4 = x(3x-4)+1(3x-4) = (3x - 4)(x + 1)

Therefore, zeroes of polynomial equation$3x^2$ – x – 4 are (4/3, -1)

Sum of zeroes = (4/3)+(-1) = (1/3)= -(-1/3) = -(Coefficient of x) / (Coefficient of x^2)

Product of zeroes=(4/3)×(-1) = (-4/3) = (Constant term) /(Coefficient of x^2)

2. Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively.
(i) 1/4 , -1

Solution:

From the formulas of sum and product of zeroes, we know,
Sum of zeroes = α+β
Product of zeroes = α β
Sum of zeroes = α+β = 1/4
Product of zeroes = α β = -1

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-
x^2–(α+β)x +αβ = 0

x^2–(1/4)x +(-1) = 0

$4x^2$–x-4 = 0

Thus,$4x^2$–x–4 is the quadratic polynomial.

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

Solution:

Sum of zeroes = $\alpha + \beta = \sqrt{2}$
Product of zeroes = $\alpha\ \beta = 1/3$

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

$x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$x^2 - (\sqrt{2})x + (1/3) = 0$

$3x^2 - 3\sqrt{2}x + 1 = 0$

Thus, $3x^2 - 3\sqrt{2}x + 1$ is the quadratic polynomial.

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

Solution:
Given,
Sum of zeroes = $\alpha+\beta = 0$
Product of zeroes = $\alpha\ \beta = \sqrt{5}$
∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

$x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$x^2 - (0)x + \sqrt{5} = 0$

Thus, $x^2 + \sqrt{5}$ is the quadratic polynomial.

(iv) 1, 1

Solution:

Given,
Sum of zeroes = $\alpha+\beta = 1$
Product of zeroes = $\alpha\ \beta = 1$

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

$x^2-(\alpha+\beta)x+\alpha\beta = 0$

$x^2-x+1 = 0$

Thus , $x^2-x+1$is the quadratic polynomial.

(v) -1/4, 1/4

Solution:

Given,
Sum of zeroes = $\alpha+\beta = -1/4$
Product of zeroes = $\alpha\ \beta = 1/4$

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

$x^2-(\alpha+\beta)x+\alpha\beta = 0$

$x^2-(-1/4)x+(1/4) = 0$

$4x^2+x+1 = 0$

Thus,$4x^2+x+1$ is the quadratic polynomial.

(vi) 4, 1

Solution:

Given,
Sum of zeroes = $\alpha+\beta = 4$
Product of zeroes = $\alpha\beta = 1$

∴ If α and β are zeroes of any quadratic polynomial, then the quadratic polynomial equation can be written directly as:-

$x^2-(\alpha+\beta)x+\alpha\beta = 0$

$x^2-4x+1 = 0$

Thus,x^2-4x+1 is the quadratic polynomial.