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classmate

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Ch-2
Polynomials
Exercise 2.3

Q.1 (i) $f(x) = x^3 - 6x^2 + 11x - 6$
 $g(x) = x^2 + x + 1$

$$\begin{array}{r} x-7 \\ x^2+x+1 \overline{) x^3-6x^2+11x-6} \\ \underline{x^3+x^2+x} \\ (-) (-) (-) \\ -7x^2+10x-6 \\ \underline{-7x^2-7x-7} \\ (+) (+) (+) \\ 17x+1 \end{array}$$

$q(x) = [x-7]$
 $r(x) = [17x+1]$

Q.2 (ii) $f(x) = 10x^4 + 17x^3 - 62x^2 + 30x - 3$
 $g(x) = 2x^2 + 7x + 1$

$$\begin{array}{r} 5x^2-9x-2 \\ 2x^2+7x+1 \overline{) 10x^4-17x^3-62x^2+30x-3} \\ \underline{10x^4+35x^3+5x^2} \\ (-) (-) (-) \\ -18x^3-67x^2+30x-3 \\ \underline{-18x^3-63x^2-9x} \\ (+) (+) (+) \\ -4x^2+39x-3 \end{array}$$

$q(x) = [5x^2-9x-2]$
 $r(x) = [53x-1]$

$$\begin{array}{r} -4x^2+39x-3 \\ \underline{-4x^2-14x-2} \\ (+) (+) (+) \\ 53x-1 \end{array}$$

$$(i) \begin{cases} f(x) = 4x^3 + 8x + 8x^2 + 7 \\ g(x) = 2x^2 - x + 1 \end{cases}$$

$$\begin{array}{r} 2x+5 \\ 2x^2-x+1 \overline{) 4x^3+8x^2+8x+7} \\ \underline{4x^3-2x^2+2x} \\ 10x^2+6x+7 \\ \underline{10x^2-5x+5} \\ 11x+2 \end{array}$$

$$\begin{array}{r} 2x+5 \\ 2x^2-x+1 \overline{) 4x^3+8x^2+8x+7} \\ \underline{4x^3-2x^2+2x} \\ 10x^2+6x+7 \\ \underline{10x^2-5x+5} \\ 11x+2 \end{array}$$

$$q(x) = 2x+5$$

$$r(x) = 11x+2$$

$$(ii) \begin{cases} f(x) = 15x^3 - 20x^2 + 13x - 12 \\ g(x) = 2 - 2x + x^2 \end{cases}$$

$$\begin{array}{r} 15x+10 \\ x^2-2x+2 \overline{) 15x^3-20x^2+13x-12} \\ \underline{15x^3-30x^2+30x} \\ 10x^2-17x-12 \\ \underline{10x^2-20x+20} \\ 3x-32 \end{array}$$

$$q(x) = 15x+10$$

$$r(x) = 3x-32$$

$$(iii) \begin{cases} f(x) = 6x^5 - x^4 + 4x^3 - 5x^2 - x - 15 \\ g(x) = 2x^2 - x + 3 \end{cases}$$

Division on next page $\longrightarrow$

$$\begin{array}{r}
 3x^3 + x^2 - 2x - 5 \\
 2x^2 - x + 3 \overline{) 6x^5 - x^4 + 4x^3 - 5x^2 - x - 15} \\
 \underline{6x^5 - 3x^4 + 9x^3} \\
 (-) \quad (+) \quad (-) \\
 2x^4 - 5x^3 - 5x^2 - x - 15 \\
 \underline{2x^4 - x^3 + 3x^2} \\
 (-) \quad (+) \quad (-) \\
 -4x^3 - 8x^2 - x - 15 \\
 \underline{-4x^3 + 2x^2 - 6x} \\
 (+) \quad (-) \quad (+) \\
 -10x^2 + 5x - 15 \\
 \underline{-5x^2 + 5x + 15} \\
 (+) \quad (-) \quad (+) \\
 -5x^2 + 5x - 15 \\
 \underline{-5x^2 + 5x + 15} \\
 0
 \end{array}$$

$\therefore g(x)$ is a factor of $f(x)$

Q.3 $f(x) = 2x^4 + x^3 - 14x^2 - 19x - 6$

$$\begin{array}{l|l}
 x = -2 & x = -1 \\
 x + 2 = 0 & x + 1 = 0
 \end{array}$$

$$\begin{aligned}
 \Rightarrow (x+2)(x+1) &= 0 \\
 x^2 + (2+1)x + (2 \times 1) &= 0 \\
 x^2 + 3x + 2 &= 0
 \end{aligned}$$

$\therefore (x^2 + 3x + 2)$ is a factor of $f(x)$

Division on next page $\rightarrow$

Q3 //

$$\begin{array}{r}
 2x^2 - 5x - 3 \\
 x^2 + 3x + 2 \overline{) 2x^4 + x^3 - 14x^2 - 19x - 6} \\
 \underline{2x^4 + 6x^3 + 4x^2} \\
 (-) \quad (-) \quad (-) \\
 -5x^3 - 18x^2 - 19x - 6 \\
 \underline{-5x^3 - 15x^2 - 10x} \\
 (+) \quad (+) \quad (+) \\
 -3x^2 - 9x - 6 \\
 \underline{-3x^2 - 9x - 6} \\
 (+) \quad (+) \quad (+) \\
 0
 \end{array}$$

$$\begin{aligned}
 & 2x^4 + x^3 - 14x^2 - 19x - 6 \\
 &= (x^2 + 3x + 2)(2x^2 - 5x - 3) \\
 &= \cancel{(x^2 + 3x + 2)(2x^2 - 2x - 3x - 3)} \\
 &= \cancel{(x^2 + 3x + 2)[2x(x-1) - 3(x-1)]} \\
 &= (x^2 + 3x + 2)(2x^2 - 6x + x - 3) \\
 &= (x^2 + 3x + 2)[2x(x-3) + 1(x-3)] \\
 &= (x^2 + 3x + 2)(2x+1)(x-3) \\
 &= (x+2)(x+1)(2x+1)(x-3)
 \end{aligned}$$

Other zeros -

$2x+1=0$ $x = -\frac{1}{2}$	$x-3=0$ $x = 3$
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$$f(x) = x^3 + 13x^2 + 32x + 20$$

$$x = -2$$

$$x+2=0$$

$\therefore (x+2)$ is a factor of $f(x)$.

Q4

$$\begin{array}{r}
 x^2 + 11x + 10 \\
 x+2 \overline{) x^3 + 13x^2 + 32x + 20} \\
 \underline{x^3 + 2x^2} \\
 (-) \quad (-) \\
 11x^2 + 32x + 20 \\
 \underline{11x^2 + 22x} \\
 (-) \quad (-) \\
 10x + 20 \\
 \underline{10x + 20} \\
 (-) \quad (-) \\
 0
 \end{array}$$

$$\begin{aligned}
 & x^3 + 13x^2 + 32x + 20 \\
 &= (x+2)(x^2 + 11x + 10) \\
 &= (x+2)(x^2 + 10x + x + 10) \\
 &= (x+2)[x(x+10) + 1(x+10)] \\
 &= (x+2)(x+10)(x+1)
 \end{aligned}$$

Other zeros -

$$x+10=0$$

$$\boxed{x = -10}$$

$$x+1=0$$

$$\boxed{x = -1}$$

Q.5 $f(x) = x^4 - 3x^3 - x^2 + 9x - 6$

$$x = -\sqrt{3}$$

$$x + \sqrt{3} = 0$$

$$x = \sqrt{3}$$

$$x - \sqrt{3} = 0$$

$$\Rightarrow (x + \sqrt{3})(x - \sqrt{3}) = 0$$

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

$$x^2 - 3 = 0$$

$\therefore (x^2 - 3)$ is a factor.

$$\begin{array}{r}
 x^2 - 3x + 2 \\
 x^2 - 3 \overline{) 2x^4 - 3x^3 - x^2 + 9x - 6} \\
 \underline{x^4 + 0x^3 - 3x^2} \\
 (-) \quad (-) \quad (+) \\
 -3x^3 + 2x^2 + 9x - 6 \\
 \underline{-3x^3 + 0x^2 + 9x} \\
 (+) \quad (-) \quad (-) \quad \cancel{+} \\
 2x^2 - 6 \\
 \underline{2x^2 - 6} \\
 (-) \quad (+) \\
 0
 \end{array}$$

$$\begin{aligned}
 & 2x^4 - 3x^3 - x^2 + 9x - 6 \\
 &= (x^2 - 3)(x^2 - 3x + 2) \\
 &= (x^2 - 3)(x^2 - 2x - x + 2) \\
 &= (x^2 - 3)[x(x-2) - 1(x-2)] \\
 &= (x + \sqrt{3})(x - \sqrt{3})(x-2)(x-1)
 \end{aligned}$$

Other zeros -

$$\begin{array}{l}
 x - 2 = 0 \\
 \boxed{x = 2}
 \end{array}$$

$$\begin{array}{l}
 x - 1 = 0 \\
 \boxed{x = 1}
 \end{array}$$

$$f(x) = 2x^4 - 2x^3 - 7x^2 + 3x + 6$$

$$x = -\frac{\sqrt{3}}{2}$$

$$x = \frac{\sqrt{3}}{2}$$

$$x + \frac{\sqrt{3}}{2} = 0$$

$$x - \frac{\sqrt{3}}{2} = 0$$

Q6

$$\Rightarrow \left(x + \sqrt{\frac{3}{2}}\right) \left(x - \sqrt{\frac{3}{2}}\right) = 0$$

$$x^2 - \left(\sqrt{\frac{3}{2}}\right)^2 = 0$$

$$x^2 - \frac{3}{2} = 0$$

$$2x^2 - 3 = 0 \times 2$$

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

$\therefore (2x^2 - 3)$ is a factor.

$$\begin{array}{r}
 x^2 - x - 2 \\
 2x^2 - 3 \overline{) 2x^4 - 2x^3 - 7x^2 + 3x + 6} \\
 \underline{2x^4 + 0x^3 - 3x^2} \\
 (-) \quad (-) \quad (+) \\
 -2x^3 - 4x^2 + 3x + 6 \\
 \underline{-2x^3 + 0x^2 + 3x} \\
 (+) \quad (-) \quad (-) \\
 -4x^2 + 6 \\
 \underline{-4x^2 + 6} \\
 (+) \quad (-) \\
 0
 \end{array}$$

$$\begin{aligned}
 & 2x^2 - 2x^3 - 7x^2 + 3x + 6 \\
 &= (2x^2 - 3)(x^2 - x - 2) \\
 &= (2x^2 - 3)(x^2 - 2x + x - 2) \\
 &= (2x^2 - 3)[x(x-2) + 1(x-2)] \\
 &= \left(x + \sqrt{\frac{3}{2}}\right) \left(x - \sqrt{\frac{3}{2}}\right) (x-2) (x+1)
 \end{aligned}$$

Other zeros -

$$x - 2 = 0$$

$$\boxed{x = 2}$$

$$x + 1 = 0$$

$$\boxed{x = -1}$$

$$f(x) = x^4 + x^3 - 34x^2 - 4x + 120$$

$$x = 2$$

$$x - 2 = 0$$

$$x = -2$$

$$x + 2 = 0$$

$$\Rightarrow (x+2)(x-2) = 0$$

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

$$x^2 - 4 = 0$$

$\therefore (x^2 - 4)$ is a factor.

$$\begin{array}{r} x^2 + x - 30 \\ x^2 - 4 \overline{) x^4 + x^3 - 34x^2 - 4x + 120} \\ \underline{x^4 + 0x^3 - 4x^2} \\ (-) \quad (-) \quad (+) \end{array}$$

$$\begin{array}{r} x^3 - 30x^2 - 4x + 120 \\ x^3 + 0x^2 - 4x \\ \underline{x^3 + 0x^2 - 4x} \\ (-) \quad (-) \quad (+) \end{array}$$

$$\begin{array}{r} -30x^2 + 120 \\ -30x^2 + 120 \\ \underline{-30x^2 + 120} \\ (+) \quad (-) \end{array}$$

0

$$x^4 + x^3 - 34x^2 - 4x + 120$$

$$= (x^2 - 4)(x^2 + x - 30)$$

$$= (x^2 - 4)(x^2 + 6x - 5x - 30)$$

$$= (x^2 - 4)[x(x+6) - 5(x+6)]$$

$$= (x^2 - 4)(x+6)(x-5)$$

Other zeros

$$x + 6 = 0$$

$$\boxed{x = -6}$$

$$x - 5 = 0$$

$$\boxed{x = 5}$$

Q.8 $f(x) = 2x^4 + 7x^3 - 19x^2 - 14x + 30$

$$x = -\sqrt{2}$$

$$x + \sqrt{2} = 0$$

$$x = \sqrt{2}$$

$$x - \sqrt{2} = 0$$

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

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

$$x^2 - 2 = 0$$

$\therefore (x^2 - 2)$ is a factor.

$$\begin{array}{r}
 2x^2 + 7x - 15 \\
 x^2 - 2 \overline{) 2x^4 + 7x^3 - 19x^2 - 14x + 30} \\
 \underline{2x^4 + 0x^3 - 4x^2} \\
 (-) (-) (+) \\
 7x^3 - 15x^2 - 14x + 30 \\
 \underline{7x^3 + 0x^2 - 14x} \\
 (-) (-) (+) \\
 -15x^2 + 30 \\
 \underline{-15x^2 + 30} \\
 (+) (-) \\
 0
 \end{array}$$

$$\begin{aligned}
 & 2x^4 + 7x^3 - 19x^2 - 14x + 30 \\
 &= (x^2 - 2)(2x^2 + 7x - 15) \\
 &= (x^2 - 2)(2x^2 + 10x - 3x - 15) \\
 &= (x^2 - 2)[2x(x + 5) - 3(x + 5)] \\
 &= (x + \sqrt{2})(x - \sqrt{2})(x + 5)(2x - 3)
 \end{aligned}$$

Other zeros -

$$2x - 3 = 0$$

$$x = \frac{3}{2}$$

$$2$$

$$x + 5 = 0$$

$$x = -5$$

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PolynomialsExercise 2.3

$$f(x) = 2x^3 + x^2 - 6x - 3$$

$$x = -\sqrt{3}$$

$$x + \sqrt{3} = 0$$

$$x = \sqrt{3}$$

$$x - \sqrt{3} = 0$$

$$\Rightarrow (x + \sqrt{3})(x - \sqrt{3}) = 0$$

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

$$x^2 - 3 = 0$$

$\therefore (x^2 - 3)$ is a factor.

$$\begin{array}{r} 2x+1 \\ x^2-3 \overline{) 2x^3+x^2-6x-3} \\ \underline{2x^3+0x^2-6x} \\ (-) (+) \end{array}$$

$$\begin{array}{r} x^2-3 \\ x^2-3 \overline{) x^2-3} \\ \underline{(-) (+)} \\ 0 \end{array}$$

$$\begin{aligned} & 2x^3 + x^2 - 6x - 3 \\ &= (x^2 - 3)(2x + 1) \\ &= (x + \sqrt{3})(x - \sqrt{3})(2x + 1) \end{aligned}$$

Other zero-

$$2x + 1 = 0$$

$$\boxed{x = -\frac{1}{2}}$$

Q.10 $f(x) = x^3 + 3x^2 - 2x - 6$

$$x = -\sqrt{2}$$

$$x + \sqrt{2} = 0$$

$$x = \sqrt{2}$$

$$x - \sqrt{2} = 0$$

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

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

$$x^2 - 2 = 0$$

$\therefore (x^2 - 2)$ is a factor.

$$\begin{array}{r}
 x+3 \\
 x^2-2 \overline{) x^3+3x^2-2x-6} \\
 \underline{x^3+0x^2-2x} \\
 (-) \quad (-) \quad (+) \\
 3x^2-6 \\
 \underline{3x^2-6} \\
 (-) \quad (+) \\
 0
 \end{array}$$

$$\begin{aligned}
 & x^3 + 3x^2 - 2x - 6 \\
 &= \cancel{x^3} (x^2 - 2)(x + 3) \\
 &= (x + \sqrt{2})(x - \sqrt{2})(x + 3)
 \end{aligned}$$

Other zero -

$$x + 3 = 0$$

$$\boxed{x = -3}$$

Q.11 $f(x) = 2x^4 - 9x^3 + 5x^2 + 3x - 1$

$$x = 2 + \sqrt{3}$$

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

$$x = 2 - \sqrt{3}$$

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

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

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

$$x^2 + 4 - 4x - 3 = 0$$

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

$\therefore (x^2 - 4x + 1)$ is a factor.

$$\begin{array}{r} 2x^2 - x - 1 \\ x^2 - 4x + 1 \overline{) 2x^4 - 9x^3 + 5x^2 + 3x - 1} \\ \underline{2x^4 - 8x^3 + 2x^2} \\ (-) (+) (-) \end{array}$$

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

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

$$(+) \quad (-) \quad (+)$$

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

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

$$(+) \quad (-) \quad (+)$$

$$0$$

$$2x^4 - 9x^3 + 5x^2 + 3x - 1$$

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

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

$$= (x^2 - 4x + 1)[2x(x - 1) + 1(x - 1)]$$

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

Other zeros - $x - 1 = 0$

$$\boxed{x = 1}$$

$$2x + 1 = 0$$

$$\boxed{x = -\frac{1}{2}}$$

Q.12

$$f(x) = 3x^4 - 9x^3 + x^2 + 15x + k$$

$$g(x) = 3x^2 - 5$$

$$\begin{array}{r}
 x^2 - 3x + 2 \\
 3x^2 - 5 \overline{) 3x^4 - 9x^3 + x^2 + 15x + k} \\
 \underline{3x^4 + 0x^3 - 5x^2} \\
 (-) \quad (-) \quad (+) \\
 -9x^3 + 6x^2 + 15x + k \\
 \underline{-4x^3 + 0x^2 + 15x} \\
 (+) \quad (-) \quad (-) \\
 6x^2 + k \\
 \underline{6x^2 - 10} \\
 (-) \quad (+) \\
 k + 10
 \end{array}$$

As the remainder should be zero,

$$\therefore k + 10 = 0$$

$$\boxed{k = -10}$$

$\therefore$ The value of k is -10 .

Q.13

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

$$g(x) = x^2 + 2x - 3$$

$$\begin{array}{r}
 x^2 + 1 \\
 x^2 + 2x - 3 \overline{) x^4 + 2x^3 - 2x^2 + x - 1} \\
 \underline{x^4 + 2x^3 - 3x^2} \\
 (-) \quad (-) \quad (+) \\
 x^2 + x - 1 \\
 \underline{x^2 + 2x - 3} \\
 (-) \quad (-) \quad (+) \\
 -x + 2
 \end{array}$$

∴ The no. that must be added is $(-x+2)$ i.e. $(x-2)$.

$$f(x) = x^4 + 2x^3 - 13x^2 - 12x + 21$$

$$g(x) = x^2 - 4x + 3$$

$$\begin{array}{r}
 x^2 + 6x + 8 \\
 x^2 - 4x + 3 \overline{) x^4 + 2x^3 - 13x^2 - 12x + 21} \\
 \underline{x^4 - 4x^3 + 3x^2} \\
 6x^3 - 16x^2 - 12x + 21 \\
 \underline{6x^3 - 24x^2 + 18x} \\
 8x^2 - 20x + 21 \\
 \underline{8x^2 - 32x + 24} \\
 12x - 4
 \end{array}$$

$$\begin{array}{r}
 x^2 + 6x + 8 \\
 x^2 - 4x + 3 \overline{) x^4 + 2x^3 - 13x^2 - 12x + 21} \\
 \underline{x^4 - 4x^3 + 3x^2} \\
 6x^3 - 16x^2 - 12x + 21 \\
 \underline{6x^3 - 24x^2 + 18x} \\
 8x^2 - 30x + 21 \\
 \underline{8x^2 - 32x + 24} \\
 2x - 3
 \end{array}$$

∴ The no. that must be subtracted is $(2x-3)$.

Q.15 $f(x) = 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}$

$$x = \sqrt{2}$$

$$x - \sqrt{2} = 0$$

$\therefore (x - \sqrt{2})$ is a factor.

$$\begin{array}{r}
 6x^2 + 7\sqrt{2}x + 4 \\
 x - \sqrt{2} \overline{) 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}} \\
 \underline{6x^3 - 6\sqrt{2}x^2} \phantom{- 10x - 4\sqrt{2}} \\
 7\sqrt{2}x^2 - 10x - 4\sqrt{2} \\
 \underline{7\sqrt{2}x^2 - 14x} \phantom{- 4\sqrt{2}} \\
 4x - 4\sqrt{2} \\
 \underline{4x - 4\sqrt{2}} \\
 0
 \end{array}$$

$$\begin{aligned}
 & 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2} \\
 &= (x - \sqrt{2})(6x^2 + 7\sqrt{2}x + 4) \\
 &= (x - \sqrt{2})(6x^2 + 4\sqrt{2}x + 3\sqrt{2}x + 4) \\
 &= (x - \sqrt{2})[\sqrt{2}x(3\sqrt{2}x + 4) + 1(3\sqrt{2}x + 4)] \\
 &= (x - \sqrt{2})(3\sqrt{2}x + 4)(\sqrt{2}x + 1)
 \end{aligned}$$

Other zeros -

$$3\sqrt{2}x + 4 = 0$$

$$x = \frac{-4}{3\sqrt{2}} \times \frac{3\sqrt{2}}{3\sqrt{2}} = \frac{-12}{18\sqrt{2}} = \frac{-2\sqrt{2}}{3}$$

$$x = \frac{-2\sqrt{2}}{3}$$

Q15

$$\sqrt{2}x + 1 = 0$$

$$x = -\frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$$

$$\boxed{x = \frac{-\sqrt{2}}{2}}$$

$$f(x) = x^3 - 3\sqrt{5}x^2 + 13x - 3\sqrt{5}$$

$(x - \sqrt{5})$ is a factor of $f(x)$.

$$\begin{array}{r}
 x^2 - 2\sqrt{5}x + 3 \\
 x - \sqrt{5} \overline{) x^3 - 3\sqrt{5}x^2 + 13x - 3\sqrt{5}} \\
 \underline{x^3 - \sqrt{5}x^2} \phantom{+ 13x - 3\sqrt{5}} \\
 (-) \quad (+) \phantom{+ 13x - 3\sqrt{5}} \\
 -2\sqrt{5}x^2 + 13x - 3\sqrt{5} \\
 \underline{+ 2\sqrt{5}x^2 + 10x} \phantom{- 3\sqrt{5}} \\
 (+) \quad (-) \phantom{- 3\sqrt{5}} \\
 3x - 3\sqrt{5} \\
 \underline{3x - 3\sqrt{5}} \\
 (-) \quad (+) \\
 0
 \end{array}$$

$$\begin{aligned}
 & x^3 - 3\sqrt{5}x^2 + 13x - 3\sqrt{5} \\
 &= (x - \sqrt{5})(x^2 - 2\sqrt{5}x + 3)
 \end{aligned}$$

$$\begin{aligned}
 b^2 - 4ac &= (-2\sqrt{5})^2 - (4 \times 1 \times 3) \\
 &= 20 - 12 \\
 &= 8
 \end{aligned}$$

$$x = \frac{2\sqrt{5} + \sqrt{8}}{2} = \frac{2\sqrt{5} + 2\sqrt{2}}{2}$$

$$\boxed{x = \sqrt{5} + \sqrt{2}}$$

$$x = \frac{2\sqrt{5} - \sqrt{8}}{2} = \frac{2\sqrt{5} - 2\sqrt{2}}{2}$$

$$\boxed{x = \sqrt{5} - \sqrt{2}}$$