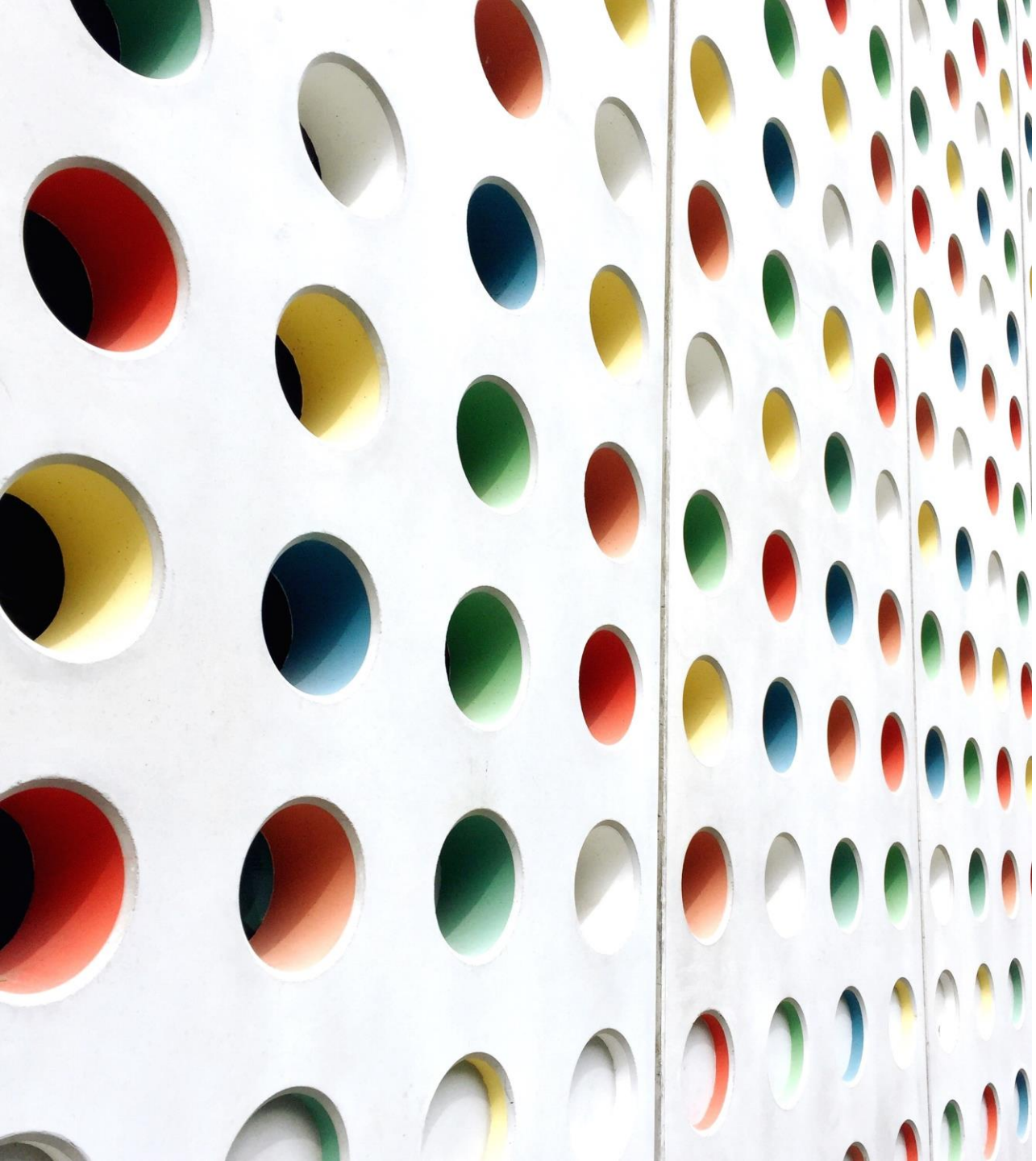

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Polynomials (Division Algorithm for Polynomials)
Chapter: 2(exercise: 2.3)

NITISH KUMAR

Divide $2x^2 + 3x + 1$ by $x + 2$.

$$x+2 \overline{)\, 2x^2 + 3x + 1} \quad 2x - 1$$

$$2x^2 + 4x$$

$$-x + 1$$

$$-x - 2$$

$$3$$

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

2) 412

4

12

12

0

206

Divide $3x^3+x^2+2x+5$ by $1+2x+x^2$.

x^2+2x+1) $3x^3+x^2+2x+5$ ($3x-5$

$3x^3+6x^2+3x$

$-5x^2-x+5$

$-5x^2-10x-5$

$9x+10$

$3x^3+x^2+2x+5$

$= (x^2+2x+1)(3x-5)+(9x+10)$

Divide the polynomial p(x) by the polynomial g(x) and find the quotient and remainder in each of the following :

$p(x) = x^4 - 3x^3 + 4x + 5, \quad g(x) = x^2 + 1 - x$

$x^2 - x + 1 \overline{)\, x^4 - 3x^3 + 0x^2 + 4x + 5}$ $\quad$ $1x^2 - 2x - 3$

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

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

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

$-3x^2 + 6x + 5$

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

$3x + 8$

$x^4 - 3x^3 + 4x + 5 = (x^2 - x + 1)(x^2 - 2x - 3) + (3x + 8)$

Jacta

$t^2 - 3,\ 2t^4 + 3t^3 - 2t^2 - 9t - 12$

$t^2 - 3$ | $2t^4 + 3t^3 - 2t^2 - 9t - 12$ | $2t^2 + 3t + 4$

$2t^4 \quad -6t^2$

$3t^3 + 4t^2 - 9t - 12$

$3t^3 \quad -9t$

$4t^2 - 12$

$4t^2 - 12$

0

$t^2 = 3$

$t = \pm\sqrt{3}$

$(t - \sqrt{3})$

$(t + \sqrt{3})$

$2t^4 + 3t^3 - 2t^2 - 9t - 12$

$= (2t^2 + 3t + 4)(t^2 - 3) + (0)$

(2)

$(a-b)(a+b) = a^2 - b^2$

Find all the zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 7$, if you know that two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

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

$x^2 - 2$

$x^2-2 \;\big)\; 2x^4 - 3x^3 - 3x^2 + 6x - 2 \;\big(\; 2x^2 - 3x + 1$

$2x^4 \quad -4x^2$

$-3x^3 + x^2 + 6x - 2$

$-3x^3 \quad +6x$

$x^2 - 2$

$x^2 - 2$

0

(x^2-2) , $(2x^2-3x+1)$

$(\sqrt{2}, -\sqrt{2}, \tfrac{1}{2}, 1)$

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

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

$(2x-1)(x-1)$

$2x - 1 = 0 \quad | \quad x - 1 = 0$

$x = \tfrac{1}{2} \quad | \quad x = 1$

$2 \times 1 = 2$

$1 \times 2 = 2$

$-2x - 1 = 2$

$-2 - 1$

$= -3$

Obtain all other zeroes of $3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

$x = \sqrt{\frac{5}{3}}, -\sqrt{\frac{5}{3}}$, $\left(x-\sqrt{\frac{5}{3}}\right)\left(x+\sqrt{\frac{5}{3}}\right) = x^2 - \frac{5}{3}$

$-\frac{5}{3} \times 3$

$-\frac{5}{3} \times 6^2$

9

$x^2 - \frac{5}{3}$) $3x^4 + 6x^3 - 2x^2 - 10x - 5$ ($3x^2 + 6x + 3$

$-3x^2 \quad +5x^2$

$6x^3 + 3x^2 - 10x - 5$

$6x^3 \quad -10x$

$3x^2 - 5$

$3x^2 - 5$

0

$3x^2 + 6x + 3 = 0$

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

$3x(x+1) + 3(x+1) = 0$

$(3x+3)(x+1) = 0$

$3x + 3 = 0$ | $x + 1 = 0$

$3x = -3$ | $x = -1$

$x = -1$

$\sqrt{\frac{5}{3}}, -\sqrt{\frac{5}{3}}, -1, -1$

On dividing $x^3 - 3x^2 + x + 2$ by a polynomial g(x), the quotient and remainder were $x - 2$ and $-2x + 4$, respectively. Find g(x).

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

$x-2 \overline{)\, x^3 - 3x^2 + 3x - 2}$ $\quad x^2 - 1x + 1$

$x^3 - 2x^2$

$-x^2 + 3x - 2$

$-x^2 + 2x$

$x - 2$

$x - 2$

0

$f(x) = g(x)(x-2) + (-2x+4)$

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

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

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

$\frac{x^3 - 3x^2 + 3x - 2}{x-2} = g(x)$

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

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