Solutions

Each answer shows the steps, then the **result**.

2.1

- $(1+x)^{-1} = 1 - x + x^2 - \cdots$

2.2

- $5 = A(x+4) + B(x-1)$; $x = 1 \Rightarrow A = 1$; $x = -4 \Rightarrow B = -1$; $\dfrac{1}{x-1} - \dfrac{1}{x+4}$

3.1 A

- $(1+2x)^{1/2} = 1 + \frac{1}{2}(2x) + \frac{(1/2)(-1/2)}{2}(2x)^2 + \cdots = 1 + x - \frac{1}{2}x^2 + \cdots$

3.2

- $9x + 5 = A(2x-1) + B(x+1)$; $x = -1 \Rightarrow -4 = -3A \Rightarrow A = \frac{4}{3}$; $x = \frac{1}{2} \Rightarrow 9.5 = 1.5B \Rightarrow B = \frac{19}{3}$; $\dfrac{4}{3(x+1)} + \dfrac{19}{3(2x-1)}$

3.3

(a)

- $2 = A(1+2x) + B(1-x)$; $x = 1 \Rightarrow A = \frac{2}{3}$; $x = -\frac{1}{2} \Rightarrow B = \frac{4}{3}$; $\dfrac{2/3}{1-x} + \dfrac{4/3}{1+2x}$

(b)

- $\frac{2}{3}(1 + x + x^2) + \frac{4}{3}(1 - 2x + 4x^2)$; $= \frac{2}{3} + \frac{4}{3} + (\frac{2}{3} - \frac{8}{3})x + (\frac{2}{3} + \frac{16}{3})x^2$; $= 2 - 2x + 6x^2$

3.4

(a)

- $p(2) = 16 + 4a - 10 + 6 = 0$
- $a = \mathbf{-3}$

(b)

- $p(x) = (x-2)(2x^2 + x - 3)$ by division or comparing coefficients
- $p(x) = (\mathbf{x-2})(\mathbf{x-1})(\mathbf{2x+3})$

(c)

- remainder $= p(-1) = -2 - 3 + 5 + 6 = \mathbf{6}$

(d)

- $2x^3 - 3x^2 - 5x + 6 = (x^2+1)(2x-3) + (-7x+9)$
- quotient $\mathbf{2x-3}$; remainder $\mathbf{-7x+9}$

3.5

(a)

- $-5 < 2x - 3 < 5$
- $\mathbf{-1 < x < 4}$

(b)

- $x - 1 = 2x + 1$ gives $x = -2$
- $x - 1 = -(2x+1)$ gives $x = \mathbf{0}$; both check, so $x = \mathbf{-2}$ or $x = \mathbf{0}$