

Homework 10

1. Express each rational expression $\frac{p(x)}{q(x)}$ as a sum of partial fractions.

a. $\frac{8x - 1}{(x + 3)(x - 2)}$

c. $\frac{3x^2 + 5x - 6}{x^2(x + 2)}$

e. $\frac{x}{(x - b)^2}$

b. $\frac{13x^2 + 3x - 76}{(x - 1)(x + 2)(x - 3)}$

d. $\frac{x^3 + 3x - 2}{(x + 1)(x^2 + 2)^2}$

f. $\frac{x^5 + 1}{(x + 1)(x - 1)x^2}$

2. Factorize the denominator and then express each rational polynomial $\frac{p(x)}{q(x)}$ as a sum of partial fractions.

a. $\frac{4 - x}{x^2 + x}$

c. $\frac{8x^2 - 3x - 7}{x^3 - x}$

e. $\frac{3x^2 + 10x + 4}{8 - x^3}$

b. $\frac{2x - 27}{2x^2 + x - 15}$

d. $\frac{3x^2 + 7x - 1}{x^3 + 2x^2 + x}$

f. $\frac{6x^2 + x + 13}{x^3 + 2x^2 + 3x + 6}$

3. Find the common difference, the fifth term, the 100th term, and the nth term of the following arithmetic progression (AP).

a. $t + 3, \quad t + \frac{15}{4}, \quad t + \frac{9}{2}, \quad t + \frac{21}{4}, \dots$

b. $\frac{x}{x^2 + 1}, \quad \frac{2x^2 + x + 1}{x^3 + x^2 + x + 1}, \quad \frac{3x^2 + x + 2}{x^3 + x^2 + x + 1}, \quad \frac{4x^2 + x + 3}{x^3 + x^2 + x + 1}, \dots$

4. Find the expression for the nth term $a_n = ar^{(n-1)}$ of the geometric progression (GP) with the given terms.

a. $a_5 = -4, \quad a_9 = 16.$

b. $a_3 = e^{\ln x + 2 \ln y}, \quad a_6 = e^{\ln x + 5 \ln y}$