We now have a remainder of 1, which still has to be divided by $3x - 2$. Thus our final answer now is:

$$\frac{27x^3 + 9x^2 - 3x - 9}{3x - 2} = 9x^2 + 9x + 5 + \frac{1}{3x - 2}$$

Exercises

Use polynomal division to simplify each of the following quotients.

a) $\dfrac{x^4 + 3x^3 - x^2 - x + 6}{x + 3}$ b) $\dfrac{2x^4 - 5x^3 + 2x^2 + 5x - 10}{x - 2}$ c) $\dfrac{7x^4 - 10x^3 + 3x^2 + 3x - 3}{x - 1}$

d) $\dfrac{2x^4 + 8x^3 - 5x^2 - 4x + 2}{x^2 + 4x - 2}$ e) $\dfrac{3x^4 - x^3 + 8x^2 + 5x + 3}{x^2 - x + 3}$ f) $\dfrac{3x^4 + 9x^3 - 5x^2 - 6x + 2}{3x^2 - 2}$

g) $\dfrac{x^3 - 2x^2 - 4}{x - 2}$ h) $\dfrac{x^3 - 4x^2 + 9}{x - 3}$ i) $\dfrac{x^4 - 13x - 42}{x^2 - x - 6}$

Answers

a) $x^3 - x + 2$ b) $2x^3 - x^2 + 5$ c) $7x^3 - 3x^2 + 3$

d) $2x^2 - 1$ e) $3x^2 + 2x + 1$ f) $x^2 + 3x - 1$

g) $x^2 + 2x + 2$ h) $x^2 - x - 3$ i) $x^2 + x + 7$