

Chapter R

Section 7

A *linear combination of functions* is a sum of (constant) multiples of the functions. In parts of calculus we need to write functions as combinations of powers of x , like

$$5 \cdot x^{-1} + 3x^7 - 4 \cdot 10^x - 12.$$

A constant term is allowed since it can be understood as cx^0 . Also, $\sqrt{x} = x^{1/2} = x^{0.5}$ and $\sqrt[n]{x^m} = x^{m/n}$.

Write each function below as a linear combination of powers of x , like

$$7x^5 - 3 + x^{-7.5}.$$

Your answer can have no radicals and no ratios.

$$1. f(x) = \frac{2x^7 + x^3 - 3x + 1}{x^3}$$

$$2. f(x) = \frac{-3x^5 + x - 3\sqrt{x} + 1}{x}$$

$$3. f(x) = \frac{5x^4 - x^3 - 13x^5}{x^3}$$

$$4. f(x) = \frac{2x^5 + x^3 - 3x^2 + \sqrt{x}}{x^2}$$

$$5. f(x) = \frac{2x^7 + \sqrt{x} - 3x + 1}{\sqrt{x}}$$

$$6. f(x) = \frac{7x^2 + x - 3\sqrt{x}}{x}$$

Answers:

$$1. 2x^4 + 1 - 3x^{-2} + x^{-3}$$

$$2. -3x^4 + 1 - 3x^{-0.5} + x^{-1}$$

$$3. 5x - 1 - 13x^2$$

$$4. 2x^3 + x - 3 + x^{-1.5}$$

$$5. 2x^{6.5} + 1 - 3x^{0.5} + x^{-0.5}$$

$$6. 7x + 1 - 3x^{-0.5}$$