Exercise 23

For the following exercises, find the x- or t-intercepts of the polynomial functions.

$$f(x) = x^5 - 5x^3 + 4x$$

Solution

To find the x-intercepts, set $f(x) = 0$ and solve the equation for x.

$$x^5 - 5x^3 + 4x = 0$$

$$x(x^4 - 5x^2 + 4) = 0$$

$$x(x^2 - 4)(x^2 - 1) = 0$$

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

$$x = 0 \quad \text{or} \quad x + 2 = 0 \quad \text{or} \quad x - 2 = 0 \quad \text{or} \quad x + 1 = 0 \quad \text{or} \quad x - 1 = 0$$

$$x = 0 \quad \text{or} \quad x = -2 \quad \text{or} \quad x = 2 \quad \text{or} \quad x = -1 \quad \text{or} \quad x = 1$$

Therefore, the x-intercepts are $(-2, 0)$ and $(-1, 0)$ and $(0, 0)$ and $(1, 0)$ and $(2, 0)$.