

## Exercise 22

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

$$f(x) = x^6 - 3x^4 - 4x^2$$

### Solution

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

$$x^6 - 3x^4 - 4x^2 = 0$$

$$x^2(x^4 - 3x^2 - 4) = 0$$

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

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

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

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

$$x = 0 \quad \text{or} \quad x = -2 \quad \text{or} \quad x = 2 \quad \text{or} \quad (\text{no real soln})$$

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

