HOW TO

Given a polynomial function f, find the *x*-intercepts by factoring.

1. Set $f(x) = 0$.
2. If the polynomial function is not given in factored form:
   a. Factor out any common monomial factors.
   b. Factor any factorable binomials or trinomials.
3. Set each factor equal to zero and solve to find the x- intercepts.

EXAMPLE 2

Finding the *x*-Intercepts of a Polynomial Function by Factoring

Find the *x*-intercepts of $f(x) = x^6 - 3x^4 + 2x^2$.

Solution

We can attempt to factor this polynomial to find solutions for $f(x) = 0$.

$$\begin{array}{rl} x^6 - 3x^4 + 2x^2 = 0 & \text{Factor out the greatest common factor.} \\ x^2(x^4 - 3x^2 + 2) = 0 & \text{Factor the trinomial.} \\ x^2(x^2 - 1)(x^2 - 2) = 0 & \text{Set each factor equal to zero.} \end{array}$$

$$\begin{array}{ccccc} & & (x^2 - 1) = 0 & & (x^2 - 2) = 0 \\ x^2 = 0 & \text{or} & x^2 = 1 & \text{or} & x^2 = 2 \\ x = 0 & & x = \pm 1 & & x = \pm\sqrt{2} \end{array}$$

This gives us five x- intercepts: $(0, 0), (1, 0), (-1, 0), (\sqrt{2}, 0)$, and $(-\sqrt{2}, 0)$. See Figure 3. We can see that this is an even function.

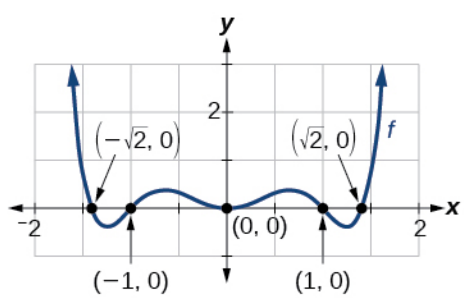

Figure 3

EXAMPLE 3

Finding the *x*-Intercepts of a Polynomial Function by Factoring

Find the x- intercepts of $f(x) = x^3 - 5x^2 - x + 5$.

Solution

Find solutions for $f(x) = 0$ by factoring.