Exercise 38

For the following exercises, find the zeros and give the multiplicity of each.

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

Solution

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

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

$$3x^2(x^2 + 2x + 1) = 0$$

$$3x^2(x+1)^2 = 0$$

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

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

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

The multiplicity of $x = 0$ is 2, and the multiplicity of $x = -1$ is 2.