Exercise 39

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

$$f(x) = 4x^5 - 12x^4 + 9x^3$$

Solution

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

$$4x^5 - 12x^4 + 9x^3 = 0$$

$$x^3(4x^2 - 12x + 9) = 0$$

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

$$x^3 = 0 \quad \text{or} \quad (2x - 3)^2 = 0$$

$$x = 0 \quad \text{or} \quad 2x - 3 = 0$$

$$x = 0 \quad \text{or} \quad x = \frac{3}{2}$$

The multiplicity of $x = 0$ is 3, and the multiplicity of $x = \frac{3}{2}$ is 2.