Exercise 41

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

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

Solution

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

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

$$4x^6(9x^2 - 12x + 4) = 0$$

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

$$x^6 = 0 \quad \text{or} \quad (3x - 2)^2 = 0$$

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

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

The multiplicity of $x = 0$ is 6, and the multiplicity of $x = \frac{2}{3}$ is 2.