Exercise 36

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

$$f(x) = x(4x^2 - 12x + 9)(x^2 + 8x + 16)$$

Solution

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

$$x(4x^2 - 12x + 9)(x^2 + 8x + 16) = 0$$

$$x^1(2x - 3)^2(x + 4)^2 = 0$$

$$x = 0 \quad \text{or} \quad (2x - 3)^2 = 0 \quad \text{or} \quad (x + 4)^2 = 0$$

$$x = 0 \quad \text{or} \quad 2x - 3 = 0 \quad \text{or} \quad x + 4 = 0$$

$$x = 0 \quad \text{or} \quad x = \frac{3}{2} \quad \text{or} \quad x = -4$$

The multiplicity of $x = 0$ is 1, the multiplicity of $x = \frac{3}{2}$ is 2, and the multiplicity of $x = -4$ is 2.