1. Find the intervals where the following function is concave up, the intervals where the function is concave down and all points of inflection.

\[ f(x) = x^4 - 6x^3 + 2x - 5 \]

**Solution:** The second derivative is \( f''(x) = 12x^2 - 36x = 12x(x - 3) \). Since this is a polynomial the only points of interest are where the second derivative is zero, namely \( x = 0 \) and \( x = 3 \). Plotting these on a number line and finding the sign of \( f''(x) \) in each interval gives us that \( f(x) \) is concave up on \((-\infty, 0) \cup (3, \infty)\), concave down on \((0, 3)\) and has points of inflection at \( x = 0 \) and \( x = 3 \).