1. Suppose $f(x) \to -\infty$ as $x \to -\infty$ and $f(x) \to -\infty$ as $x \to +\infty$.

Describe the degree and the leading coefficient of this polynomial function.

Sketch a graph of a polynomial function that matches this criteria.
2. Describe the degree, state the zeros, state all intervals for the x-values for which \( f \) is positive, and negative, then write an equation.

Degree:__________________

Zeros:____________________

\( f(x) > 0: \)___________________

\( f(x) < 0: \)___________________

If \((-0.5, 3)\) is a coordinate on this graph, then a possible equation is:

\[ y = \boxed{\text{equation}} \]

\textit{Advanced Questions:}

3. Given: \( f(x) = -4(x + 3)^6n(x - 2)^{2n+4} \), (where \( n \) is an integer.)

What is the degree of the this polynomial function (in terms of \( n \))?______________

Why?

\[ \text{As } x \to \infty, \text{ then } f(x) \to \boxed{\text{value}}. \]

\[ \text{As } x \to -\infty, \text{ then } f(x) \to \boxed{\text{value}}. \]
4. Consider the polynomial function: \( f(x) = a(x - b)^2(x - c)^m \)
Assume the constant \( m \) is a positive integer, and \( a \neq 0 \). For each of the following statements, decide whether the statement is True or False, then explain your answer \textit{and} modify any false statement so that it is true, where necessary.

a) The degree of \( f(x) \) is \( 2m \).________________
   Why?

b) The graph of the function \( f(x) \) \textit{could} pass through the origin \((0, 0)\).________________
   Why?

c) The graph of \( f(x) \) has exactly one \( y \)-intercept.________________
   Why?

5. For the function, \( f(x) \) shown below, if \( f(-5) = 0 \), and \( f(3) = 0 \), then find all roots of the following equation algebraically:
\[ x^4 + 3x^3 - 12x^2 - 13x - 15 = 0 \]