1. Given a positive leading coefficient, a root of $x = -5$ with a multiplicity of 2, a root of $x = 1$ with a multiplicity of 1 and a root of $x = 4$ with a multiplicity of 1, produce a sketch of this polynomial function.
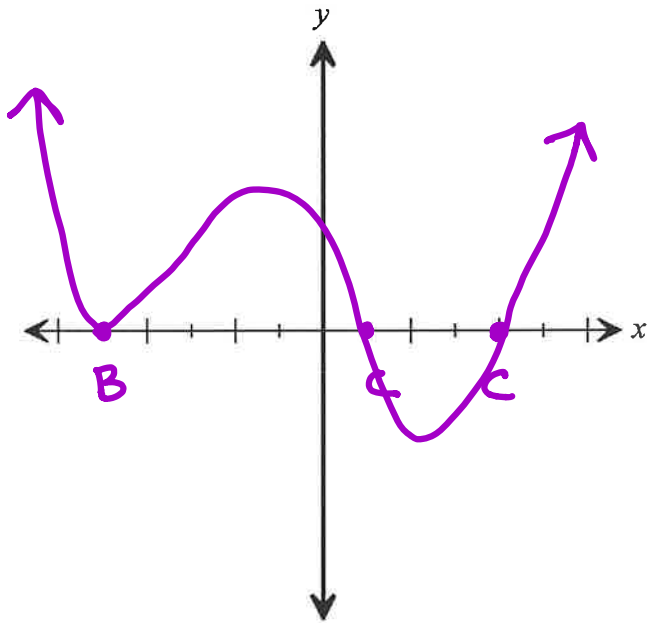
X = -5   X = 1   X = 4
M = 2   M = 1   M = 1
  B   C   C

Degree 4: (even)
positive
↑ ↑

2. Given the polynomial function sketch shown below, find the following:
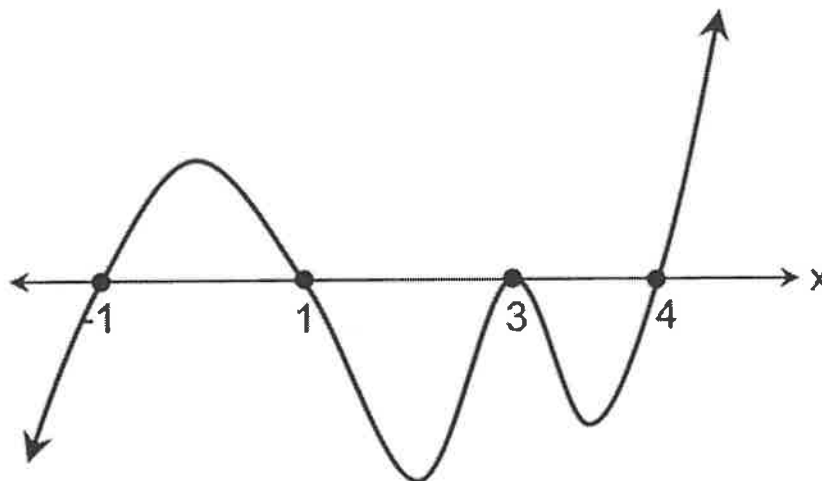
a. Degree of the polynomial: __5__

b. Sign of the leading coefficient: __positive__

c. Identify the roots: __X = -1   X = 1   X = 3   X = 4__
                           M = 1   M = 1   M = 2   M = 1

d. Identify the multiplicity of each root: ____

e. Identify the end behavior: __X → ∞, f(x) → ∞__
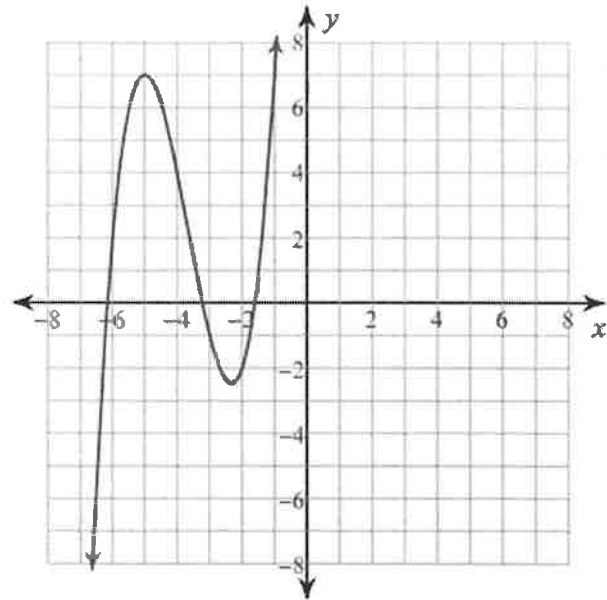   X → -∞, f(x) → -∞

3. Given the graph, determine whether the degree of the function is even or odd, state the sign of the leading coefficient, and state the end behavior.

Degree: **odd**

Sign of Leading Coefficient: **positive**

$x \to \infty, \quad f(x) \to$ **∞**

$x \to -\infty, \quad f(x) \to$ **$-\infty$**

4. Given the equation $y = 3x^4 - 2x^3 + x^2 - x + 3$, determine the end behavior

$x \to \infty, \quad f(x) \to$ **∞**

$x \to -\infty, \quad f(x) \to$ **∞**

even
positive } ↑↑

5. Factor: $(x+2)^2 - 6(x+2) - 40$

let $y = x+2$

$y^2 - 6y - 40$

$(y-10)(y+4)$

$(x+2-10)(x+2+4)$

$(x-8)(x+6)$

OR

$(x+2)(x+2) - 6x - 12 - 40$

$x^2 + 4x + 4 - 6x - 52$

$x^2 - 2x - 48$

$(x-8)(x+6)$