1. Sketch the following curves, indicating maximum and minimum points and points of inflection. Show all work and graph on a separate graph paper. *Use graphing calculator only to check your work!*

1. \( y = 6 - 2x - x^2 \)

2. \( y = 12 - 12x + x^3 \)

3. \( y = x^3 - 3x^2 + 4 \)

For #3:

Derivative: ____________________________

Increasing on \( (__,__) \), \( (__,__) \)

Decreasing on \( (__,__) \)

Relative maximum at \( (__,__) \)

Relative minimum at \( (__,__) \)

Second derivative: ____________________________

Concave Up on \( (__,__) \)

Concave Down on \( (__,__) \)

Point of Inflection at \( (__,__) \)
II. Sketch a smooth curve illustrating the following characteristics or properties:

4. If \( y \) is a function of \( x \) such that \( y' > 0 \) for all \( x \) and \( y'' < 0 \) for all \( x \), sketch the curve.

5. Sketch \( y = f(x) \), given that
   
   \[
   f(1) = 0 \\
   f'(x) < 0 \quad \text{for } x < 1 \\
   f'(x) > 0 \quad \text{for } x > 1
   \]

6. Sketch \( y = f(x) \), given that
   
   \[
   f(1) = -2 \\
   f''(x) < 0 \quad \text{for } x < 1 \\
   f''(x) > 0 \quad \text{for } x > 1
   \]

7. Sketch \( y = f(x) \), given that
   
   \[
   f(-2) = 8 \quad \text{and } f'(-2) = 0 \\
   f(0) = 4 \\
   f(2) = 0 \\
   f''(x) < 0 \quad \text{for } |x| < 2 \\
   f''(x) < 0 \quad \text{for } x < 0 \\
   f''(x) > 0 \quad \text{for } x > 0 \\
   f'(x) > 0 \quad \text{for } |x| > 2
   \]
8. Sketch the function which is
   Increasing on \((-\infty,0)\) and \((2,\infty)\)
   Decreasing on \((0,2)\)
   Concave up on \((1,\infty)\)
   Concave down on \((-\infty,1)\)
   Relative maximum at \((0,4)\)
   Relative minimum at \((2,0)\)
   Point of inflection at \((1,1)\)

9. Sketch the curve with
   y-axis symmetry
   horizontal asymptote: \(y = 0\)
   vertical asymptotes: \(x = -2, x = 2\)
   increasing on \((0,2)\) and \((2,\infty)\)
   decreasing on \((-\infty,-2)\) and \((-2,0)\)
   concave up on \((-2,2)\)
   concave down on \((-\infty,-2)\) and \((2,\infty)\)
   \(f(0) = 2\)

10. Sketch the curve which is
    Increasing on \((-\infty,0)\) and \((1,\infty)\)
    Decreasing on \((0,1)\)
    Tangent with undefined slope at the origin
    Horizontal tangent at \((1,-1)\)
    Concave up for all \(x\) except \(x = 0\)
    No concavity at \((0,0)\)