Test   Chapter 5   Curve Sketching   Name ___________________

Show all work on your own paper.
Do NOT write anywhere on this test except for question #1.
You may NOT use a calculator on this test.

1. Give the following information for the function:

$$y = x^4 + 4x^3$$

Derivative: ____________________________________

Increasing on (___ , ___) and (___ , ___)

Decreasing on (___ , ___)

Relative Minimum at (___ , ___)

Second Derivative: ____________________________

Concave Up on (___ , ___) and (___ , ___)

Concave Down on (___ , ___)

Points of Inflection at(___ , ___) and (___ , ___)

2. 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),
   and has a
   relative maximum at (0, 4),
   relative minimum at (2, 0),
   point of inflection at (1, 1).

3. Sketch a curve that satisfies the following conditions:

$\frac{dy}{dx} < 0$ on $(-\infty, 0)$ and $(2, +\infty)$ $\frac{dy}{dx} > 0$ on $(0, 2)$

$\frac{d^2y}{dx^2} < 0$ on $(1, +\infty)$ $\frac{d^2y}{dx^2} > 0$ on $(-\infty, 1)$

$f(0) = 0$ $f(2) = 4$ $f(1) = 1$

4. Sketch y = f(x), given that

$f(1) = -3$
$f''(x) > 0$ for $x < 1$
$f''(x) < 0$ for $x > 1$

5 – 7. Sketch the following curves, indicating relative maximum and relative minimum points.

5. Sketch $y = 6 - 2x - x^2$

6. Sketch $y = 12 - 12x + x^3$

7. Sketch $y = -x^4 + 4x^2 + 8$

8. In sketching a curve, how does finding the second derivative help?

9. Find the interval(s) of *x* for which the function *f* defined by $f(x) = \left(x^2 - 3\right)e^{-x}$ is increasing.

10. Determine the constant *k* so that the function $f(x) = x^2 + \frac{k}{x}$ will have a point of inflection at x = 1.