Name: _____ Practice Unit 2

Sketch a possible graph of each function with the given information:

1. $f'(x) < 0$, for x < 2
   $f''(x) > 0$, for x < 2
   $f(x) = 1$, for $x \geq 2$
   f(0) = 2

2. $f'(x) > 0$, for x > 1
   $f'(x) = -1$, for x < 1
   f(1) = -1
   $\lim_{x \to \infty} f(x) = 4$

3. $f'(x) > 0$, for $x \neq 0$
   $f'(0)$ does not exist
   $f''(x) > 0$, for x < 0
   $f''(x) < 0$, for x > 0
   f(0) = 1

Find where each function is increasing, decreasing, concave up, and concave down. Find the x-coordinate of each critical point. Classify each critical point as a relative maximum, relative minimum, inflection point, or none of those.

4. $f(x) = 1 + 12x - 3x^2 - 2x^3$

Increasing: _____ Concave up: _____

Decreasing: _____ Concave Down: _____

Classify critical points: x = ____, _____
x = ____, _____
x = ____, _____
x = ____, _____

5. $f(x) = x - \cos x$

Increasing: _____ Concave up: _____

Decreasing: _____ Concave Down: _____

Classify critical points: x = ____, _____
x = ____, _____
x = ____, _____
x = ____, _____

6. $f(x) = 4x^3 - x^4$

Increasing: _____ Concave up: _____

Decreasing: _____ Concave Down: _____

Classify critical points: x = ____, _____
x = ____, _____
x = ____, _____
x = ____, _____

Find the absolute maximum and minimum value for each function and the value of x where the max or min occurs on the given interval

7. $f(x) = 6x^3 - 6x^4 + 5$ on $[-1,2]$

8. $f(x) = \sin^2 x + \cos x$ on $[0,2\pi]$

9. $f(x) = x^{\frac{2}{3}}(20 - x)$ on $[-1,20]$

10. A particle moves along a straight line with a position according to the function $s(t) = t^4 - 4t^3 + 6t^2 - 20$ Find the particles maximum and minimum velocity and acceleration on the interval from t = 0 to t = 3.