Name _____

Directions: Show your work for full credit. If you need extra room, use the back of the opposite page, clearly indicating the problem number.

1. Compute the derivative of each of the following, putting in steps for full credit:

   (a) $g(x) = \sqrt{x^3 - 2x + 2}$

   (b) $f(x) = x \sin^2(2x)$

2. Determine the intervals for the graph of

$$f(x) = x^4 - 24x^2 + 4$$

   where the function is

   (a) increasing,
   (b) decreasing,
   (c) concave up,
   (d) and concave down.

   Using this information determine the local maxima, local minima and inflection points.

3. Compute the equation of the tangent line to the curve $x^3y - y^3 + x^2 + 2x = 15$ at the point $(2, 1)$.

4. On [0,4] sketch the graph of the function $f(x)$ that satisfies all of the stated conditions:

   (a) $f(0) = 1$, $f(1) = 2$, $f(2) = 0$, $f(3) = 1$, $f(4) = 2$

   (b) $f' > 0$ on (0,1), (2,3), and (3,4). $f' < 0$ on (1,2). $f'(1) = f'(3) = 0$ and $f'(2)$ does not exist.

   (c) $f'' < 0$ on (0,2) and (2,3). $f'' > 0$ on (3,4). $f''(3) = 0$

   Determine the local extrema, inflection points, and global extrema.

5. A metal disk expands during heating. If its radius expands at the rate of 0.02 inches per second, how fast is the area of one of its faces increasing when the radius reaches 8.1 inches?

6. Using differentials, estimate $\sqrt{79.03}$.