MAT 136 (Calculus I), Prof. Jim Swift:
Worksheet on the Shape of Graphs

Name: _____

You may work with others, but turn in your own paper. Do this worksheet without the help of a calculator or computer. You may use the back if needed.

Let the function f be defined by $f(x) = x^3 - 3x^2 + 1$. The domain of f is all real numbers.

(1) Find $f'(x)$ and $f''(x)$.

(2) Sketch the graphs of f' and f''. Complete these sentences with intervals written in the form (a, b), $(-\infty, b)$, or (a, ∞).

f is increasing and concave up on f is increasing and concave down on

f is decreasing and concave up on f is decreasing and concave down on

(3) Find the critical points of f. Classify each as a local maximum or a local minimum using the second derivative test.

(4) Find the inflection point of f. Recall that this is a point in the (x, y) plane that is on the graph of f.

(5) Sketch the graph of f, indicating the local extrema and the inflection point. What important features of the graph cannot be calculated without a calculator or computer?