MTH 151
Quiz 4
Fall 2011

Show all work in a neat and organized fashion. Clearly indicate your answers.
20 points possible.

1. (6 pts.) Refer to the figure on the attached page, showing the graph of a function defined on $[a, s]$. For each of the numbers a, b, c, d, r, and s, state whether the function has an absolute maximum or minimum, a local maximum or minimum, or neither a maximum nor a minimum.

2. (4 pts.) Find the differential dy of each function.

(a) $y = x^2 \cos x$

(b) $y = \tan 3x$

3. (5 pts.) (a) Find the linearization $L(x)$ of the function at a.

$$f(x) = \sqrt{x}, \qquad a = 100$$

(b) Use your answer to part (a) (or use differentials) to estimate the given number.

$$\sqrt{109}$$

4. (5 pts.) Boyle's Law states that when a sample of gas is compressed at a constant temperature, the pressure P and volume V satisfy the equation $PV = C$, where C is a constant. Suppose that at a certain instant the volume is $800\,\text{cm}^3$, the pressure is $300\,\text{kPa}$, and the pressure is increasing at a rate of $25\,\text{kPa/min}$. At what rate is the volume changing at this instant?