MATH 158 Assignment 3, Spring 2010

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Due Monday March 1st at 5:20 pm.

Section 8.1 Antiderivatives

Exercise 84.

Section 10.1 Functions of Several Variables

Exercises 6, 9, 24, 26, 31.

Section 10.2 Partial Derivatiaves

Exercises 1, 2, 5, 6, 10, 26, 35, 50, 63, 64, 66.

For question 63, it should read $V = \frac{30.9T}{P}$.

Section 10.3 Maxima and Minima

Exercises 4, 10, 27, 28, 40.

Section 10.4 Least Squares

Exercises 2, 14, 27.

Extra question. To fit n data points $(x_1, y_1), (x_2, y_2), ..., (x_n, y_n)$ with a paraboler $ax^2 + bx + c$ in the least squares sense, we want to minimize

$$A = \sum_{i=1}^{n} (ax_i^2 + bx_i + c - y_i)^2.$$

Calculate the partial derivatives of $\frac{\partial A}{\partial a}$, $\frac{\partial A}{\partial b}$, and $\frac{\partial A}{\partial c}$ and then simplify the equations

$$\frac{\partial A}{\partial a} = 0, \; \frac{\partial A}{\partial b} = 0, \; \frac{\partial A}{\partial c} = 0.$$

Do this using Σ notation. You should get a linear system of equations in a, b, c.
For $\partial A/\partial b = 0$ you should get

$$a\sum_{i=1}^{n} x_i^3 \; + \; b\sum_{i=1}^{n} x_i^2 \; + \; c\sum_{i=1}^{n} x_i \; = \; \sum_{i=1}^{n} x_i y_i.$$