

# MATH 158 Assignment 4, Spring 2011

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Due Monday March 14th at 5:20 pm.

## Section 10.4 The Method of Least Squares

Exercises 27, 28, 29, 30.

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

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

Calculate the partial derivatives  $\frac{\partial A}{\partial a}$ ,  $\frac{\partial A}{\partial b}$ , 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  $\Sigma$  notation. You should get a linear system of equations in  $a, b, c$ .

## Section 10.7 Double Integrals

Exercises 3, 4, 12, 14, 26.

## Section 10.8 Applications of Double Integrals

Exercises 2, 4, 5, 6, 10, 15, 18, 28, 29.

## Section 11.1 Differential Equations

Exercises 4, 5, 11.

## Section 11.2 Separation of Variables

Exercises 6, 26, 39, 44, 46.

## Section 11.3 Applications of Differential Equations

Exercises 2, 5, 10, 18.