

Directions: Work all problems in the assignment. If you need more room use the back of the page to complete the problem.

**Section 7.5**

Problem 14. Examine each function for relative extrema and saddle points.

$$f(x, y) = x^2 - 3xy + y^2$$

Problem 28. Find the critical points and test for relative extrema. List the critical points for which the second partial derivative test fails.

$$f(x, y) = x^3 + y^3 - 3x^2 + 6y^2 + 3x + 12y + 7$$

Problem 38. **Revenue** A retail outlet sells two competitive products, the prices of which are  $p_1$  and  $p_2$ . Find  $p_1$  and  $p_2$  so as to maximize the total revenue

$$R = 500p_1 + 800p_2 + 1.5p_1p_2 - 1.5p_1^2 - p_2^2.$$

## Appendix c.1

Problem 16. Verify that the function is a solution of the differential equation.

$$y = Ce^{-t} + 10 \quad y' + y - 10 = 0$$

Problem 36. Determine whether the function

$$y = 4e^{2t}$$

is a solution for the following differential equation

$$y^{(4)} - 16y = 0$$

Problem 42. Verify that the general solution satisfies the differential equation. Then find the particular solution that satisfies the initial condition.

$$\begin{array}{ll} \text{General Solution:} & 2x^2 + 3y^2 = C \\ \text{Differential Equation:} & 2x + 3yy' = 0 \\ \text{Initial Condition:} & y = 2 \text{ and } x = 1 \end{array}$$

Problem 54. Use integration to find the general solution of the differential equation

$$\frac{dy}{dx} = \frac{1}{1+x}$$

Problem 66. **Investment** The rate of growth of an investment is proportional to the amount in the investment at any time  $t$ . That is,

$$\frac{dA}{dt} = kA$$

The initial investment is \$1000 and after 10 years the balance is \$3320.12. The general solution is

$$A = Ce^{kt}$$

What is the particular solution?

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