Math 150 Chapter 6 Review Name:_____
Ms. Meier

1) Country workshop manufactures both finished and unfinished furniture for the home. The estimated quantities demanded each week of its rolltop desks in the finished and unfinished versions are x and y units when the corresponding unit prices are:

$p = 200 - \frac{1}{5}x - \frac{1}{10}y$
$q = 160 - \frac{1}{10}x - \frac{1}{4}y$ dollars respectively.

a) Find the Revenue function R(x,y)

b) Compute R(100, 60) and Interpret

2) Find the first order partial derivatives of each:

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

b) $f(x,y) = xLny + yLnx$

c) $f(x,y) = 3x^2 - 4xy^2 + 6y^3 + xe^{3y}$

d) $f(x,y) = (x^2 - xy + y^2)^5$

3) Find the second order partial derivatives of $f(x,y) = x^3 - 3x^2y + 3xy^2 + y^2$

4) The total weekly revenue of the Country workshop associated with manufacturing and selling their rolltop desks is given by: $R(x,y) = -0.2x^2 - 0.25y^2 - 0.2xy + 200x + 160y$ where x denotes the number of finished units and y the number of unfinished units manufactured and sold each week. Compute and Interpret $R_x(x,y)$ *and* $R_y(x,y)$ when x = 300 and y =250.

5) Find any relative extrema or saddle points for: $f(x,y) = 4y^3 + x^2 - 12y^2 - 36y + 2$

6) The total weekly revenue in dollars that Acrosonic realizes in producing and selling its bookshelf speakers is given by: $R(x,y) = -\frac{1}{4}x^2 - \frac{3}{8}y^2 - \frac{1}{4}xy + 300x + 240y$ where x denotes the number of fully assembled units and y the number of unassembled kits produced and sold each week. The total weekly cost for the production of these speakers is $C(x,y) = 180x + 140y + 5000$ dollars. Determine how many of each type of speaker units should be produced and sold each week to maximize profit. What is the maximum weekly profit?

7) Evaluate each Integral:

a) $\int_0^4 3xy^2\,dy$ b) $\int_0^2 (3x + 5y)\,dx$ c) $\int_1^2 \int_1^4 (x + 2y)\,dx\,dy$ d) $\int_0^2 \int_x^{2x} (x^2 + y^2)\,dy\,dx$

Answers:

1) a. see problem 4 b. the revenue is $25500 when selling 100 finished and 60 unfinished desks

2) a. $f_x = 2x - y^2$ *and* $f_y = -2xy + 3y^2$ b. $f_x = Lny + \frac{y}{x}$ and $f_y = \frac{x}{y} + Lnx$

c. $f_x = 6x - 4y^2 + e^{3y}$ and $f_y = -8xy + 18y^2 + 3xe^{3y}$ d. $f_x = 5(2x - y)(x^2 - xy + y^2)^4$ and $f_y = 5(2y - x)(x^2 - xy + y^2)^4$

3) $f_{xx} = 6x - 6y$ $f_{yy} = 6x + 2$ $f_{xy} = f_{yx} = -6x + 6y$

4) The weekly revenue increases by $30/unit for each additional finished desk produced (beyond 300) when the level of production of unfinished desks remains fixed at 250. Also The revenue decreases by $25/unit when each additional unfinished desk (beyond 250) is produced and the level of production of finished desks remains fixed at 300.

5) Saddle point at (0,-1) , Relative Minimum occurs at (0,3) this relative minimum is -106

6) If they produce 208 assembled units and 64 unassembled kits the weekly profit will be maximized at $10,680.

7) a. 64x b. 6 + 10y c. 33/2 d. 40/3