Math 105 91A[1] January 17th, 19100 Worksheet 2

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1. Suppose the cost c of producing q_A units of product A and q_B units of product B is given by $c = \sqrt{q_A^2 + 6q_B}$. Find $\frac{\partial^2 c}{\partial q_A \partial q_B}$.

2. Find the candidates of relative maxima-minima of the following functions:

$$z = f(x, y) = 4x^2 + 6y^2 - 8xy + 5x - 3y + 1.$$

3. Skippy's produces two types of peanut butter, say A-non-fat and B-Lots of fat for which the average cost of production are constant at \$2 and \$3 per pound. The quantities q_A and q_B pounds of A and B that can be sold each week are given by the joint-demand functions:

$$q_A = 400(p_B - P_A) \quad \text{and} \quad q_B = 400(9 + p_A - 2p_B),$$

where p_A and p_B are selling prices of A and B respectively. Determine the possible selling prices that will maximize the company's profit.

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[1] **Office hours:** Monday:2:30-4:00pm, Tuesday:11:30-12:30, 3:30-4:30 pm, Wednesday: 10:30-11:30 am

Answers to the problems in worksheet 1 not done in class

2. The level sets of the curve (1a) are straight lines x=10, x=20, x=30. The level sets of the curve (1c) are circles centered at the origin and of radius 25 at $z = 25$ and 13 at $z = 169$.

5 (a) $f_x(x, y) = \sqrt{1 + x + 3y^2} + x\frac{1}{2}(1 + x + 3y^2)^{-\frac{1}{2}} \cdot (0 + 1 + 0)$,
$f_y(x, y) = x\frac{1}{2}(1 + x + 3y^2)^{-\frac{1}{2}} \cdot (0 + 0 + 6y)$.
5(b)$f_\theta(r, \theta, z) = \frac{r}{r^2+z^2}(0 - (-\sin(2\theta)2))$, $f_z(r, \theta, z) = (2 - \cos(2\theta)\frac{(r^2+z^2)\cdot(0)-r(2z)}{(r^2+z^2)^2}$.
5(c) $f_s(s, t) = \frac{1}{\sqrt{1-(\frac{s}{t})^2}} \cdot \frac{1}{t}$, $f_t(s, t) = \frac{1}{\sqrt{1-(\frac{s}{t})^2}} \cdot \frac{-s}{t^2}$