Math 2211: Recitation 8 (T)

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(1) Solve any **two** the following problems:

(a) Find the local maximum and minimum values and saddle point of the function

$$f(x, y) = 3 - x^4 + 2x^2 - y^2.$$

(b) Use Langrange multipliers to find the extreme values of the function $f(x, y) = x^2 - y^2$ subject to the constraint $x^2 + y^2 = 49$.

(c) Find the local maximum and minimum values and saddle point of the function

$$f(x, y) = y^2 - 4y\cos(x).$$

(2) Solve the following problems. **(Do any one of them)**.

(a) Consider the function $f(x, y) = x^2+y^2+x^2y+5$, defined on the set $D = \{(x, y) \mid |x| \leq 1,\ |y| \leq 1\}$. Find the absolute maximum and minimum values of f on the set D.

(b) Find the absolute maximum and minimum values of f on the set D where
$f(x, y) = x^3 - 3x - y^3 + 12y + 2, \qquad D$ is a quadrilateral whose vertices are $(-2, 3), (2, 3), (2, 2), (-2, -2)$.

(c) Find the dimensions of the rectangular box with largest volume if the total surface area is given as $16\,cm^2$.

(Bonus) Solve the following integrals. **(Do any two of them)**.

(a) Use Langrange multipliers to find the points on the cone $z^2 = x^2 + y^2$ that are closest to the point $(18, 4, 0)$.

(b) Evaluate the double integral on R where

$$\int\int_R (4x - 2y^2), \qquad R = \{(x, y) : 0 \leq x \leq 5, 0 \leq y \leq 3\}.$$

(c) Find three positive integers whose sum is 240 and whose product is maximum.