Exercise 7 (Assignment 3)

- **Due date: Monday, November 25**

Exercise 7 (Assignment 3) Questions

1. For each of the following functions, do the following:

   (1) check whether they are concave/convex,

   (2) draw the upper level sets $U_t = \{x \in R^2 | f(x) \geq t\}$ for for $t = 1$

   (3) Is U_t convex for all $t \in R$?

   (a) $f(x) = -x_1^2 - x_2$

   (b) $f(x) = x_1^2 - x_2$

2. Consider the function
$$f(x, y) = x^\alpha y^\beta$$

   defined on R_{++}^2 for $\alpha, \beta > 0$. Use the bodered hessian to give sufficient conditions for f to be strictly quasi-concave

3. Consider the function

$$f(x, a, b) = 3 - x_1^2 - ax_2^2 - 2x_1x_2 + 2b^2x_1 + 4x_2$$

   where $a > 1$.

   (a) Solve the following problem:

$$f^*(a, b) = \max_x f(x, a, b)$$

   (argue that you solution is global maximum)

   (b) Find $\frac{\partial f^*(a,b)}{\partial a}$ and $\frac{\partial f^*(a,b)}{\partial b}$

4. Text book questions:

Page #	Exercise #	Question #
374	12.4	2, 4a, 4b*, 4c*, 7, 8
341	11.6	2
* : no need to check their graphs since the 3-D graphs could be tough		