Assignment 10
Not for handing in

12.6.3, 12.6.6, 12.9.1, 12.9.10

E.1 Perform three steps of Newton's method for finding a critical point of $f(x, y) = 2x - x^2 + xy - y^2/2 - x^2y^2/2$, starting at $x = 1$, $y = 0$. Does this appear to be converging toward a local maximum or a local minimum?

E.2 Consider the quadratic programming problem

$$\begin{aligned} &\text{maximize } c_1x_1 + c_2x_2^2 \\ &\text{subject to } x_1 + x_2 \leq 1 \\ &\qquad x_1, x_2 \geq 0 \end{aligned}$$

Under what conditions on the constants c_1 and c_2 do each of the following occur?

(a). The global maximum is at $(1, 0)$. *Hint: compare the value there to the values at the other corners of the feasible region.*

(b). A local maximum is at $(1, 0)$.

E.3 Use the Karush-Kuhn-Tucker conditions to solve Example 8 on page 660:

$$\begin{aligned} &\text{maximize } KL \\ &\text{subject to } 4K + L \leq 8 \\ &\qquad K, L \geq 0 \end{aligned}$$

E.4 Consider the problem

$$\begin{aligned} &\text{maximize } 2x_1 + 3x_2 \\ &\text{subject to } x_1^2 + 3x_2^2 \leq 4 \\ &\qquad x_1^2 - x_2 \leq 0 \end{aligned}$$

(a) Why (without solving the problem) can you be sure that there is only one local maximum for this problem?

(b) Use the Karush-Kuhn-Tucker conditions to solve the problem.

(c) Use LINGO to solve the problem, and compare the values in the Dual Price column to the λ_1 and λ_2 values you found in **(b)**.