EC 701 Advanced Micro Economics, HW 3 Production

The following homework assignment is to be submitted via email to Dorothy Kemboi at dck00004@mix.wvu.edu with a "cc" to me at roger.congleton@mail.wvu.edu. The answers are due before class time at on Tuesday September 12. They should be typed up and emailed to Dorothy in Word. (This will take a bit of time, but it is good practice.) Dorothy will grade them and return them within a couple of days.

(1) Suppose that Acme is a profit maximizing firm that sells its output in a perfectly competitive market and has the one-input production function $Q=5L^{1.5}$. Labor is hired for 20 dollars an hour. Find Acme's (a) cost function, (b) profit maximizing output, and (c) the quantity of labor hired when the price of the output is 100.

(2) Suppose that Acme is a profit maximizing firm that sells its output in a perfectly competitive market and has the one-input production function $Q=5L^{1.5}$. Labor is hired for w dollars an hour. Characterize Acme's (a) cost function, (b) profit maximizing output, and (c) the quantity of labor hired when the price of the output is P. (d) What is Acme's demand for labor function?

(3) Suppose that Acme is a profit maximizing firm and has the following Cobb-Douglas production function, $Q = L^a K^{1-a}$ where is greater than zero but less than one. Labor (L) is hired for w dollars per hour and capital (K) is rented for r dollars per hour. (a) Derive Acme's demand for labor and capital function as a function of output. (b) Derive its cost function. (c) Derive its profit maximizing output.

(4) Suppose that Apex is a profit maximizing firm and has the following production function, $Q = q(L, K)$, which is assumed to be strictly concave. Labor (L) is hired for w dollars per hour and capital (K) is rented for r dollars per hour. Apex sells its output for P dollars per unit. (a) Derive Acme's demand for labor and capital function as a function of output. (b) Derive its cost function. (c) Derive its profit maximizing output.

(5) Discuss some of the advantages and disadvantages associated with assuming that a firm's production function exhibits diminishing marginal returns over its entire range. Use a diagram to illustrate advantages associated with weakening the assumption to assuming diminishing returns after some output, Q^x is reached. [You should write on the order of 6 sentences to answer these questions. Several of your sentences should refer to your diagram. (Hint: I suggest that you focus on one-input production processes to simplify your discussion and diagram.)