

# Problem Set 19

November 5, 2009

1. Consider a profit-maximizing firm with the production function  $y = f(x_1, x_2)$ , facing output price  $p$  and factor prices  $w_1$  and  $w_2$ . Suppose this firm is taxed according to the total cost of factor 2, ie,  $tax = tw_2x_2$ .
  - (a) Derive the factor demand functions. Are they homogeneous of any degree in any of the factors?
  - (b) Show that if the tax rate rises, the firm will use less of factor 2.
  - (c) Show that  $\frac{\partial x_1^*}{\partial t} = w_2 \frac{\partial x_2^*}{\partial w_1}$
2. Consider a profit-maximizing firm with production function  $y = f(x_1, x_2)$  that sells its output competitively at price  $p$ . The firm obtains input  $x_1$  at a competitively determined unit wage  $w_1$  but the firm faces an upward-sloping supply function of  $x_2$  given by  $w_2 = w_2^0 + kx_2$  where  $w_1, w_2^0, p$ , and  $k$  are positive parameters.
  - (a) Derive the first and second order conditions.
  - (b) Derive the comparative static results available for the parameter  $w_1$ .