

## Microeconomics — class 11

1. Calculate the cost function and conditional factor demand for technology with production function.

- a) Cobb-Douglas  $f(z_1, z_2) = z_1^{a_1} \cdot z_2^{a_2}$  with  $a_i > 0$ ;
- b) linear  $f(z_1, z_2) = z_1 \cdot a_1 + z_2 \cdot a_2$  with  $a_i > 0$ ;
- c) Leontiev technology  $f(z_1, z_2) = \min\{z_1 \cdot a_1, z_2 \cdot a_2\}$  with  $a_i > 0$ .

2. Calculate the cost function and conditional factor demand for technology with production function.  $f(z_1, z_2) = \min\{z_1 + 2z_2, z_2 + 2z_1\}$

3. Can the function  $c(\mathbf{w}, y)$  be a cost function for a firm maximizing profit? If Yes, calculate the profit function, supply function and (assuming that it is correct) conditional factor demand and generalized supply correspondences.

- a)  $c(\mathbf{w}, y) = \sqrt{y} \cdot (w_1 \cdot w_2)^{\frac{3}{4}}$ ;
- b)  $c(\mathbf{w}, y) = y \cdot (w_1 + \sqrt{w_1 \cdot w_2} + w_2)$ ;
- c)  $c(\mathbf{w}, y) = y \cdot (w_1 - \sqrt{w_1 \cdot w_2} + w_2)$ ;
- d)  $c(\mathbf{w}, y) = (y + \frac{1}{y}) \cdot \sqrt{w_1 \cdot w_2}$ .

4. Given profit function and conditional factor demand for Cobb-Douglas, linear and Leontiev technologies, calculate again the profit function and generalized supply correspondence.

5. A firm has two plants with identical production function: in Poland and Finland

$f(K, L) = K^{\frac{a}{2}} \cdot L^{\frac{a}{2}}$  for some  $a > 0$ . Calculate, how production  $y$  is divided

- a) if the factor prices are identical  $w_1 = w_2 = 1$  in both countries;
- b) if in Poland  $w_1^P = w_2^P = 1$ , while in Finland  $w_1^F = w_2^F = 2$ .

6. A competitive firm MacroHard has two plants with identical production function

$f(K, L) = (KL)^{\frac{1}{4}}$ , in Poland, where price of capital is 10, and price of labour 5 and in China, where price of capital is 5, and price of labour 1. The firm has a contract to produce 10 units of product. How is it going to divide production between factories, what will be the factor inputs and costs in each of them

- a) in long run;
- b) in short run, if the firm has 0 units of capital in China, while in Poland 10.