

TD – Monday, November 20, 2023

Producer Theory

The following exercises should be submitted on Monday, November 20.

**Exercise 1.**  $L = 2$  is the number of commodities. The firm produces commodity 2 by using commodity 1 as an input.

1. The production function is  $f(z) = \alpha(1 - \exp(-kz))$  with  $k > 0$ ,  $\alpha > 0$  and  $z \geq 0$ .

- Determine and draw the production set  $Y$  determined by the production function  $f$ .
- For every level of output  $\bar{y}_2 \geq 0$ , determine and draw the following set

$$Y(\bar{y}_2) := \{z \in \mathbb{R}: z \geq 0 \text{ and } f(z) \geq \bar{y}_2\}$$

- Write the cost minimization problem of this firm.
- Determine the demand of inputs and the cost function of the firm.

2. The production function is  $f(z) = \alpha\sqrt{z}$  with  $\alpha > 0$  and  $z \geq 0$ , same questions.

3. The production function is  $f(z) = \alpha z^2 + \beta z$  with  $\alpha > 0$ ,  $\beta > 0$  and  $z \geq 0$ , same questions.

**Exercise 2.**  $L = 3$  is the number of commodities. The firm produces commodity 3 by using commodities 1 and 2 as inputs. The production function is

$$f(z_1, z_2) = (z_1)^\alpha (z_2)^\beta \text{ with } \alpha > 0, \beta > 0, z_1 \geq 0 \text{ and } z_2 \geq 0$$

with  $\alpha + \beta \leq 1$ . Determine the demand of inputs and the cost function of the firm.