Quiz 10 - SOLUTION

Let's consider Zsuzsanna's short-run profit-maximization problem when input 2 is fixed at some level $\bar{x}_2$. Let $y = f(x_1, \bar{x}_2)$ be the short-run production function for the firm, let p be the price of output, and let w_1 and w_2 be the prices of the two inputs.

- Using the above notation, write the firm's profits as a function of y and x_1.

  $\pi = py - w_1 x_1 - w_2 \bar{x}_2$

- Rearrange the mathematical expression for the firm's profits, and express y as a function of x_1.

  $y = \frac{\pi}{p} + \frac{w_2}{p}\bar{x}_2 + \frac{w_1}{p}x_1$

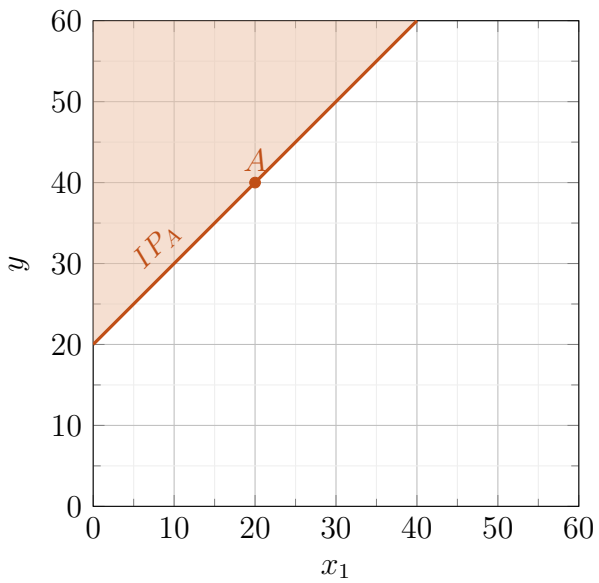
  This equation describes the firm's isoprofit lines.

- Consider situation A in which $\bar{x}_2 = 1$, $p = 5$, $w_1 = 5$ and $w_2 = 50$.

  - Suppose that, in situation A, the firm maximized its profits by using 20 units of the first input to produce 40 units of output. In the graph below, mark the firm's profit-maximizing choice and label it A. How much profits did the firm earn?

    $\pi(p = 5, w_1 = 5, w_2 = 50, y = 40, x_1 = 20, \bar{x}_2 = 1) = 5 \cdot 40 - 5 \cdot 20 - 50 \cdot 1 = 50$

  - In the graph below, draw the firm's isoprofit line that corresponds to 50 units of profits, and label it IP_A. ($y = \frac{50}{5} + \frac{50}{5} \cdot 1 + \frac{5}{5}x_1 = 20 + x_1$)



- In the graph above, shade in the area representing input-output combination that would give more than 50 units of profits to the firm.

- Why did the profit-maximizing firm not choose any of the points in the shaded area?

  Because those input-output combinations are not feasible given the firm's technology.