Micoreconomics — class 10

1. Write production functions for the following cases.

a) For 100 km my car consumes 10 litres of LPG or petrol;

b) A translator can translate 5 pages per hour, half of time using computer and the remaing time thinking.

2. Prove proposition:

If $\mathbb{Y}$ has nondecreasing returns to scale then either $\Pi(\mathbf{p}) = 0$ with $\mathbf{0} \in \mathbf{y}(\mathbf{p})$, or $\Pi(\mathbf{p}) = +\infty$ with $\mathbf{y}(\mathbf{p}) = \emptyset$.

3. Check returns to scale and calulate the profit function and the generalized supply correspondence 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) linaer: $f(z_1, z_2) = z_1 \cdot a_1 + z_2 \cdot a_2$ with $a_i > 0$;

c) Leontiev technology: $f(z_1, z_2) = min\{z_1 \cdot a_1, z_2 \cdot a_2\}$ with $a_i > 0$.

Calculate the cost function and conditional factor demand correspondence.

Isn't it easier to use them to calulate the profit function and the generalized supply correspondence?

4. Prove **Hotelling's Lemma**:

if $\mathbf{y}$ is a differentiable function, a Lagrange multiplier λ exists and the transformation function F is differentiable, then Π is differentiable $\nabla\Pi = \mathbf{y}$.

5. Can $\Pi(\mathbf{p}) = p_3 - \sqrt{p_1 \cdot p_2}$ be a profit function of a competitive, profit maximizing firm. Calulate (assuming it's possible) the generelized supply correspondence. Is there one product? What can we say about returns to scale?

6. Write full conditions for profit maximization in the special case.