# Recitation #3 (09/19/2025)

1. Show that the compensating and the equivalent variation coincide when the utility function is quasilinear with respect to the first good (and we fix $p_1 = 1$). [*Hint*: Use the definitions of the compensating and equivalent variations in terms of the expenditure function (not the hicksian demand). In addition, recall that if $u(x)$ is quasilinear with respect to good 1, then we can express it as

$$u(x) = x_1 + \phi\left(x_{-1}\right),$$

where $x_{-1}$ represents all the remaining goods, $l = 2, 3, ..., L$.]

2. Consider the following profit function that has been obtained from a technology that uses a single input, $z$:

$$\pi(p, w) = p^2 w^{\alpha}$$

where $p$ is the output price, $w$ is the input price and $\alpha$ is a parameter value.

   (a) Check if the profit function satisfies homogeneity of degree one jointly in both $p$ and $w$. In particular, determine for which values of $\alpha$ this property is satisfied.

   (b) Assuming the value of $\alpha$ for which the profit function satisfies homogeneity of degree one, check if the profit function $\pi(p, w)$ satisfies the following properties: (1) non-decreasing in output price $p$, (2) non-increasing in input prices $w$, and (3) convex in prices $p$ and $w$.

   (c) Calculate the supply function of the firm, $q(p, w)$, and its demand for inputs, $z(p, w)$.