ID Sol 2

Quiz#4 EE320 Semester 1/2019: Answer the question in the area provided.

Suppose that demand for labor can be given by $L^* = \left(\frac{r}{w}\right)^{\alpha} Y^{\beta}$, where L^* is the optimal level of capital installation, w is the market wage, r is the capital price, and Y is the targeted level of output. Assume further that all the parameters are positive, and that $\alpha + \beta = 1$. Consider the following question

2.1 *(2 points)* Is the given function a homogeneity function in r, w and Y. If yes, state the degree of homogeneity.

2.2 *(5 points)* Derive the total differential of L^*.

2.3 *(3 points)* Calculate the elasticity of labor demand with respect to the targeted level of output (Y).

Sol 2 → Increase r, w, y by t proportion.

2.1) $\Rightarrow L^*(tr, tw, ty) = \left(\frac{tr}{tw}\right)^{\alpha} (ty)^{\beta}$

$= \left(\frac{r}{w}\right)^{\alpha} \cdot t^{\beta} \cdot y^{\beta}$

$= t^{\beta} \left(\frac{r}{w}\right)^{\alpha} \cdot y^{\beta}$

$= t^{\beta} \cdot L^*(r, w, y)$.

$\therefore L^*$ is HM degree of β in r, w, y.

2.2) $dL^* = \frac{\partial L^*}{\partial r} dr + \frac{\partial L^*}{\partial w} \cdot dw + \frac{\partial L^*}{\partial y} \cdot dy$.

$= \alpha \left(\frac{r}{w}\right)^{\alpha-1} \left(\frac{1}{w}\right) \cdot dr + \alpha \left(\frac{r}{w}\right)^{\alpha-1} \cdot \left(-\frac{r}{w^2}\right) dw + \beta \left(\frac{r}{w}\right)^{\alpha} (y)^{\beta-1} dy$.

2.3) $\ln L^* = \alpha \ln\left(\frac{r}{w}\right) + \beta \ln y$

$\ln L^* = \alpha \ln r - \alpha \ln w + \beta \ln y$

$\therefore$ Elasticity $= \frac{\partial \ln L^*}{\partial \ln y} = \beta$ #.