

Answer on Question #57806, Economics / Microeconomics

Question:

if $q = K^{0.2} L^{0.4}$ find the elasticity of substitution.

Answer:

Consider Cobb–Douglas production function $q = K^{0.2} L^{0.4}$.

The marginal rate of technical substitution is

$$MRTS_{KL} = \frac{0.2 L}{0.4 K} = \frac{L}{2K}$$

It is convenient to change the notations. Denote

$$\frac{L}{2K} = \theta$$

Rewriting this we have

$$\frac{L}{K} = 2\theta$$

Then the elasticity of substitution is

$$\sigma = \frac{d \ln\left(\frac{L}{K}\right)}{d \ln(MRTS_{KL})} = \frac{d \ln\left(\frac{L}{K}\right)}{d \ln\left(\frac{L}{2K}\right)} = \frac{d \ln(2\theta)}{d \ln(\theta)} = \frac{d 2\theta}{d \theta} \frac{\theta}{2\theta} = 1$$