

Due: Friday, July 19 (in class)

*Challenging questions are marked with *.*

Question 1: Find the marginal product (MP) of labor and capital for the following production functions:

1. $f(K, L) = 2K^{0.7}L^{0.3}$

2. $f(K, L) = 6K + 2L$

3. $f(K, L) = \min(3K, 2L)$

Question 2: Show that the following production functions exhibiting diminishing marginal product:

1. $f(K, L) = 2K^{0.7}L^{0.3}$

2. $f(K, L) = K^{0.5}L^{0.5} + K^{0.2}L^{0.4}$

Question 3: Draw isoquant for the following production functions:

1. $f(K, L) = K^{0.5}L^{0.5}$

2. $f(K, L) = 2K + L$

3. $f(K, L) = \min(2K, L)$

Question 4: Find the marginal rate of technical substitution (MRTS) for the following production functions:

1. $f(K, L) = K^{0.5}L^{0.5}$

2. $f(K, L) = 6K + 2L$

3. $f(K, L) = (K^{0.5} + L^{0.5})^2$

Question 5: Find the elasticity of substitution for the following production functions:

1. $f(K, L) = K^{0.5}L^{0.5}$

2. $f(K, L) = 6K + 2L$

3. $f(K, L) = (K^{0.5} + L^{0.5})^2$

Question 6: Check the following production functions to see if they are increasing returns to scale (IRS), constant returns to scale (CRS) or decreasing returns to scale (DRS). Prove your statement.

1. $f(K, L) = 2K^{0.3}L^{0.5}$

2. $f(K, L) = 2K^{0.6}L^{-0.6}$

3. $f(K, U, Q) = K^{0.3}H^{0.4}U^{0.3}L^{0.9}M^{0.5}X^{0.2}Q^{0.1}Z^{0.8}$

4. $*f(K, L) = K + 3L^{0.5} + K^{0.3}L^{0.5}$

5. $*f(K, L) = (K^{0.25} + L^{0.25})^2 K^{0.25} L^{0.25}$

Question 7: Suppose you know that $w = 1, r = 4, \bar{Q} = 100$, find the input demand for capital K and labor L , and the total cost for the following production functions:

1. $f(K, L) = 2K^{0.6}L^{0.4}$

2. $f(K, L) = 12K + 36L$