THE UNIVERSITY OF ZAMBIA
DEPARTMENT OF ECONOMICS
2021-2022 ACADEMIC YEAR
ECN 2115 TUTORIAL SHEET 3

1) Complete the table below

No. of mine workers (L)	Total coal output (TP$_L$)	Marginal Product (MP $_L$)	Average Product (AP$_L$)	Stage of returns
1	24			
2	72			
3	138			
4	216			
5	300			
6	384			
7	462			
8	528			
9	576			
10	600			
11	594			
12	552			

2) Assuming a decrease in wages, illustrate the Resource and Substitution Effect.

3) Define a production function and state any three types of production functions? Given a general cobb-douglas production function with α and β as the exponents, show that the MPL and MPK reduce to α* APL and β*APK for labour and capital respectively?

4) With aid of well labelled diagrams, explain and illustrate the concept behind Increasing, Constant and Decreasing Returns to Scale respectively?

5) Given that a firm maximises output given by $Q=K^\alpha L^\beta$ subject to the constraint $wL+rK=C$, derive the total function for the firm?

6) The production function for a product is given by Q = 100KL. If the price of capital is $120per day and the price of labour $30 per day, what is the minimum cost of producing 1,000 units of output?

7) A chair producer hires its assembly line labour for K30 an hour and calculates that the rental cost of its machinery is K15 per hour. Suppose that a chair can be produced using 4 hours of labour or machinery in any combination.

a)   If the firm is currently using 3 hours of labour for each hour of machine time is it minimizing its costs of production? If so why? If not, how can it improve the situation?

b)   Graphically illustrate the isoquant and the two isocost lines for the current combination of labour and capital and for the optimal combination of labour and capital.

8) You manage a plant that produces engines by teams of workers using assembly machines. The technology is summarized by the production function: Q = 5KL where Q is the number of engines per week, K is the number of assembly machines, and L is the number of labour teams. Each assembly machine rents for r = $10,000 per week and each team costs w = $5,000 per week. Engine costs are given by the cost of labour teams and machines, plus $2,000 per engine for raw materials. Your plant has a fixed installation of 5 assembly machines as part of its design.

a. What is the short run production function?

b. How much labour would be hired for any given level of output Q?

c. What is the cost function for your plant - namely, how much would it cost to produce Q engines?

d. What are average and marginal costs for producing Q engines? How do average costs vary with output?

e. How many teams are required to produce 250 engines? What is the average cost per engine?