Bachelor of Statistical Data Science
Economics 1
Assignment 3

To be submitted by 19/11/2024

1. Fill in the spaces in the accompanying table associated with the firm William Perry, Inc., that delivers refrigerators in the Chicago area, using the two inputs of labour and trucks.

Number of Trucks	Amount of Labour	Total Output	Average Product of Labour	Marginal Product of Labour
2	0	0	-	-
2	1	75		
2	2		100	
2	3			100
2	4	380		
2	5			50
2	6		75	

(10)

2. If the total product curve is a straight line through the origin, what do the average product and marginal product curves look like? What principle would lead you to expect that the total product curve would never have this shape? (2+3=5)

3. A small company that shovels sidewalks and driveways has 100 homes signed up for its services this winter. It can use various combinations of capital and labour: intensive labour with hand shovels, less labour with snow blowers, and still less labour with a pickup truck that has a snowplough on front. To summarize, the method choices are:
   Method 1: 50 units of labour, 10 units of capital
   Method 2: 20 units of labour, 40 units of capital
   Method 3: 10 units of labour, 70 units of capital
   If hiring labour for the winter costs \$100/unit and a unit of capital costs \$400, what is the best production method? What method should the company use if the cost of labour rises to \$200/unit? (5+5=10)

4. Consider the following production function used by a firm
   $$Q = K^{0.5}L^{0.5}$$
   Find the MP_k,MP_L and MRTS. (1.5+1.5+2=5)

5. Suppose for some firm the following table describe the cost structure (in rupees).

Q	Fixed Cost	Variable Cost	Total Cost	Marginal Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost
1	100	50					
2				30			
3						40	
4			270				
5							70

Fill in the spaces in the above table. (10)

6. Suppose that a firm's total cost function is described by the following quadratic cost function:

$$TC = a + bQ + cQ^2$$

Find the algebraic expressions for firm's FC, VC, MC, AFC, AVC, ATC. (10)