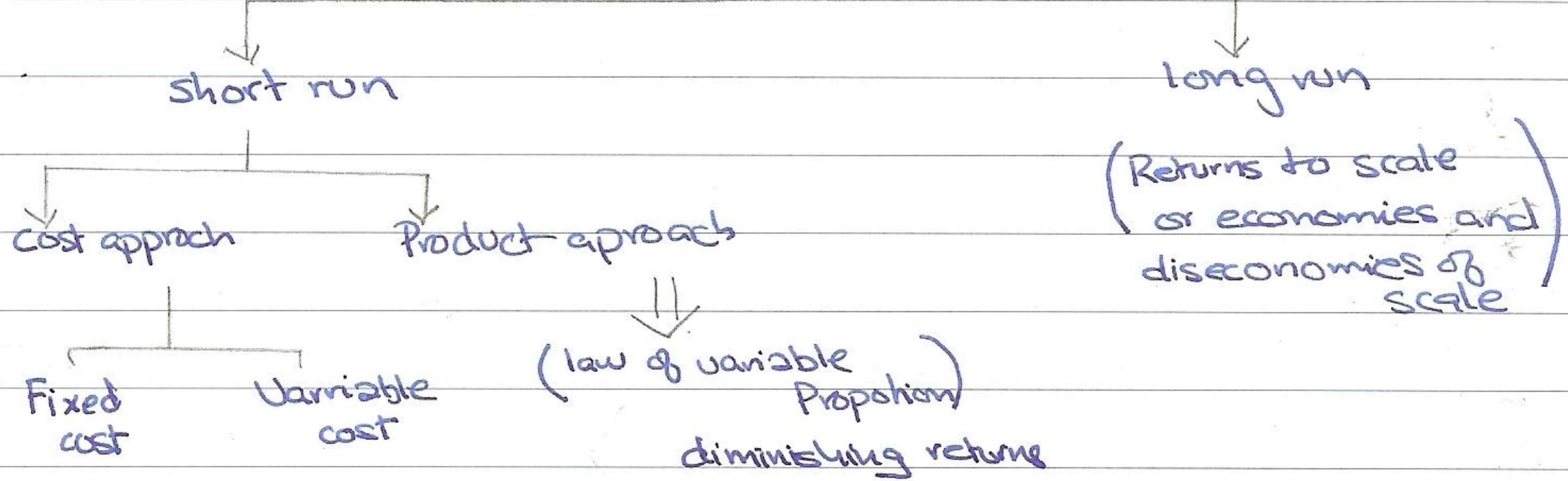


Cost of Production. Date 16th Aug 06.



SHORT RUN: refers to a time frame in which output can be altered by changing variable factors of Production, holding atleast one factor of production constant.

LONG RUN: refers to a time frame where output level can be altered by simultaneously changing all factors of production, holding no factor constant.

SHORT RUN COST APPROACH :

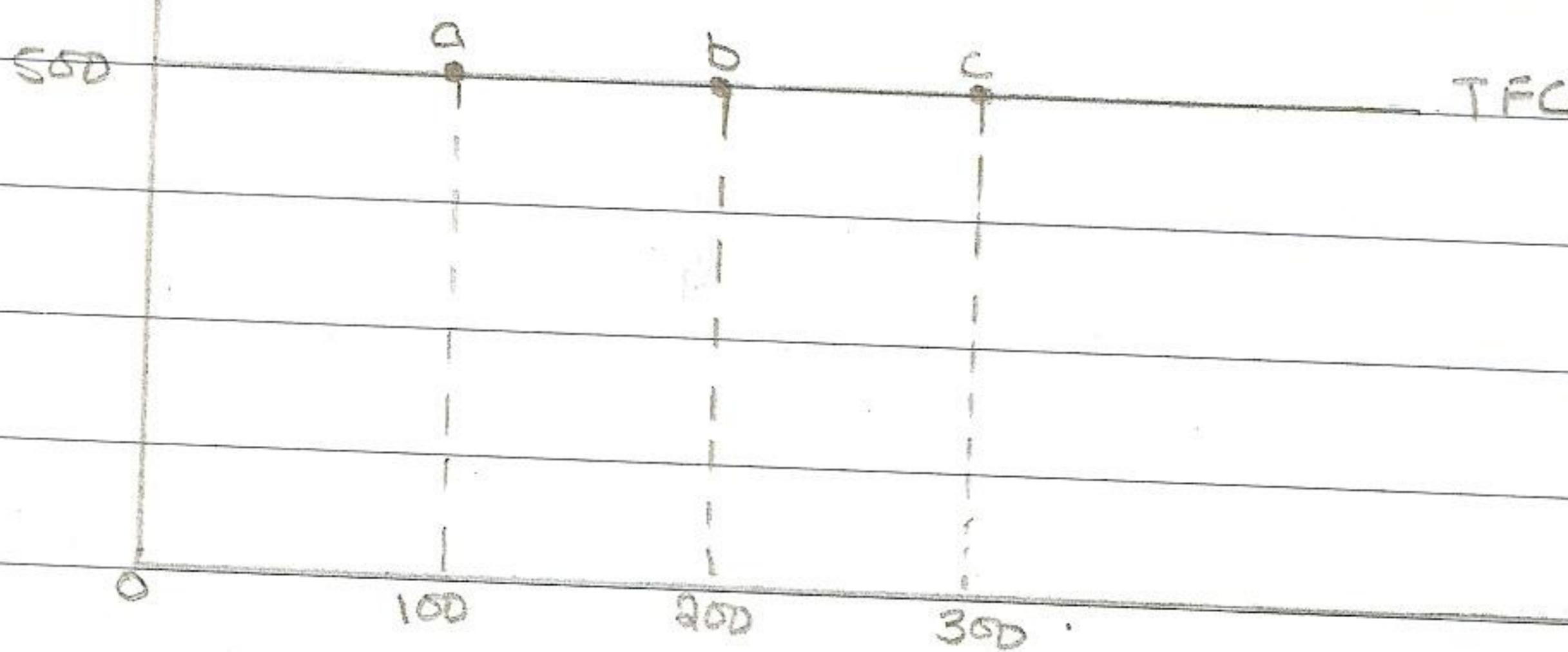
In the short run cost of production can be divided into fixed costs and variable costs. Fixed costs are entered at zero level of output and they do not vary with output level in the short run. Example of fixed costs may include: interest paid on debt/loan, cost of plant assets like machinery and equipment, lease rentals etc.

The following chart illustrates the relationship

(26)

Date _____

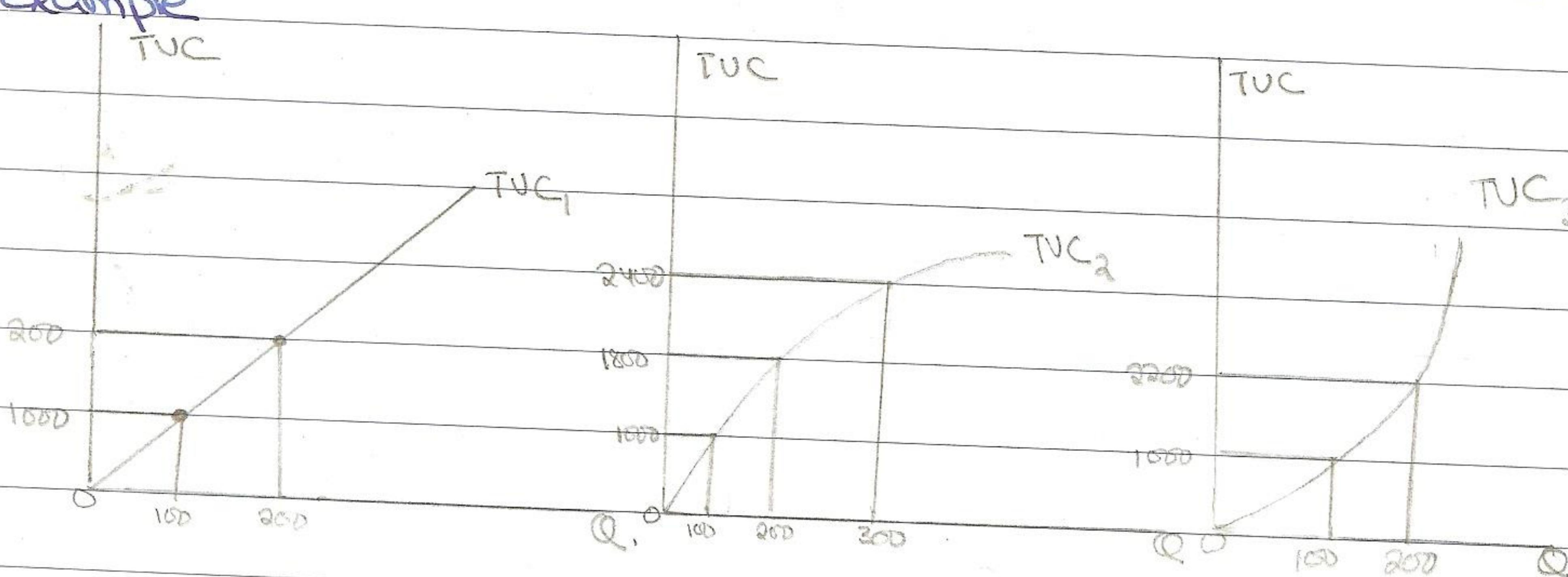
TFC (\$m)

output (short run)
in units (000)

Variable costs are defined as costs which vary positively with the level of output examples of variable costs include direct labour costs, raw material costs, heating and lighting, distribution expenses etc.

Although variable costs have a positive relationship with output level but the rate of change can be different.

example



Date _____

TVC₁ shows a linear relationship between output and variable cost which implies that the total variable cost increases at a constant rate and average variable cost stays constant.

TVC₂ shows a ~~curvy~~ ^{curvy} linear relationship between output and total variable cost. As output increases the curve flattens out which implies that total variable cost is increasing at a decreasing rate therefore average variable cost is declining.

TVC₃ shows that total variable cost is increasing at an increasing rate which implies that as output level rises average variable cost also rises.

(28)

Cost Curves in a short run.Date 16th Aug 06.

Output	TFC	TVC	TC	AFC	AUC	ATC	MC
0	150	0	150	∞	0	N/A	
5	150	30	180	30	6	36	6
10	150	50	200	15	5	20	4
15	150	65	215	10	4.3	14.3	3
20	150	90	240	7.5	4.5	12	5
25	150	125	275	6	5	11	7
30	150	180	330	5	6	11	11
35	150	250	400	4.3	7.14	11.44	14
40	150	340	490	3.75	8.5	12.25	18
45	150	460	610	3.33	10.2	13.53	24

$$TC = TFC + TVC$$

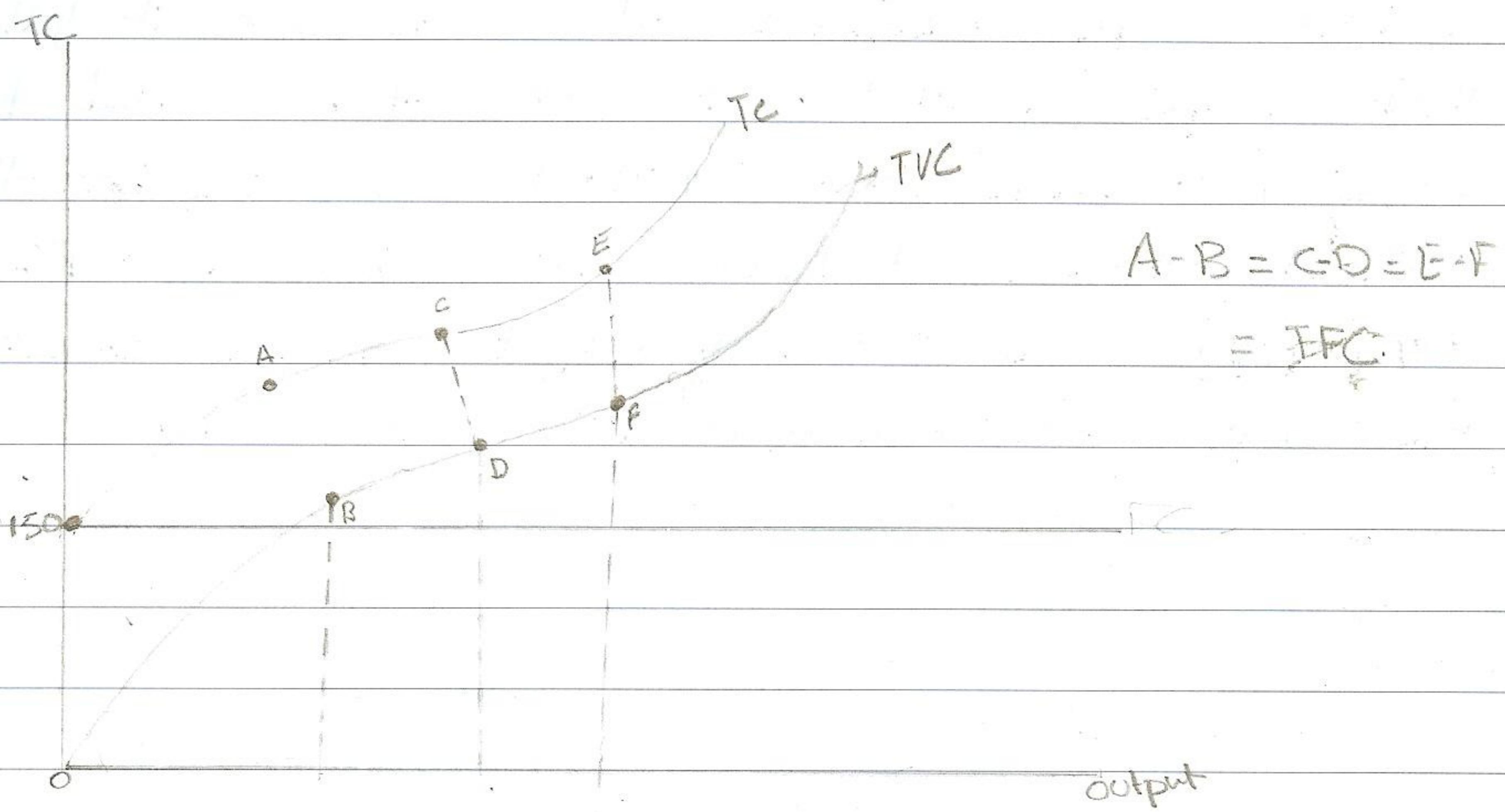
$$AFC = TFC \div Q$$

$$AVC = TVC \div Q$$

$$ATC = AFC + AVC$$

$$MC = \Delta TC \div \Delta Q$$

Analysis of short run costs

Date 18th aug 06.

- Total fixed cost never starts from origin because fixed costs are incurred even when output level is zero. However fixed costs remain independant of the level of output during short run which results in a horizontal fixed cost function parallel to output axis.
- Total variable costs ^{Positively} depend on output and hence starts from origin. The variability in the slope of total variable cost curve is because initially total variable cost increases at a decreasing rate and subsequently increases at an increasing rate.
- Total cost curve is derived through vertical summation of total fixed cost and total variable cost which

(30)

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Since slope of ^{total} fixed cost equals zero it follows that slope of total cost curve will be equal to slope of variable cost curve. This also implies that vertical distance between two points b/w TC and TVC corresponding to all levels of output will be exactly the same and equal to total fixed cost.

Average Cost Curves

Date 18th Aug 06'

$$TC = TFC + TUC$$

divide all by Q

$$ATC = AFC + AVC$$

Stg 1
0-1S

$$ATC = AFC + AVC \quad (TUC \uparrow @ \downarrow \text{rate})$$

↓ ↓ ↓ uses decreasing

(always falls)

Stg 2
1S-3S

$$ATC = AFC + AVC \quad (TUC \uparrow @ \uparrow \text{rate})$$

↓ ↓ ↑ ↑

↓ in AFC > ↑ in AVC

Stg 3
3S onwards

$$ATC = AFC + AVC$$

↑ ↓

(↓ in AFC < ↑ AVC)

AC

Stg 1

Stg 2

Stg 3

ATC curve.

11

(32)

Date

The average cost curve above shows all three stages of short-run costs.

In stage 1 ATC falls sharply because both AFC and ATC decline.

In stage 2 the fall in the ATC becomes smaller because fall in ATC is partially offset by rise in AVC. After achieving the minimum point in stage 2, ATC starts rising in stage 3 as fall in AFC is outweighed by rise in AVC.

Relationship between Marginal cost Date 21st Aug '01 and AVC

Marginal cost is defined as the cost of producing an extra unit of output. For example if the cost of producing 20 units is equal to \$500 and the cost of producing 25 is \$550 it follows that marginal cost equals $\frac{\Delta TC}{\Delta Q} = \frac{50}{5} = 10$. This means that cost of producing an extra unit is \$10.

Marginal cost determines the behavior of average variable cost that is when marginal cost starts rising, average variable cost also rises and when marginal cost falls so does average variable cost. So both Marginal cost and AVC tend to move in the same direction however the rate at which they move is different. Marginal only looks at the change and therefore moves much faster compared to average which incorporates the change into the existing base and calculates a new average. The relationship b/w marginal cost and AVC can be depicted thru the following diagram.



(34)

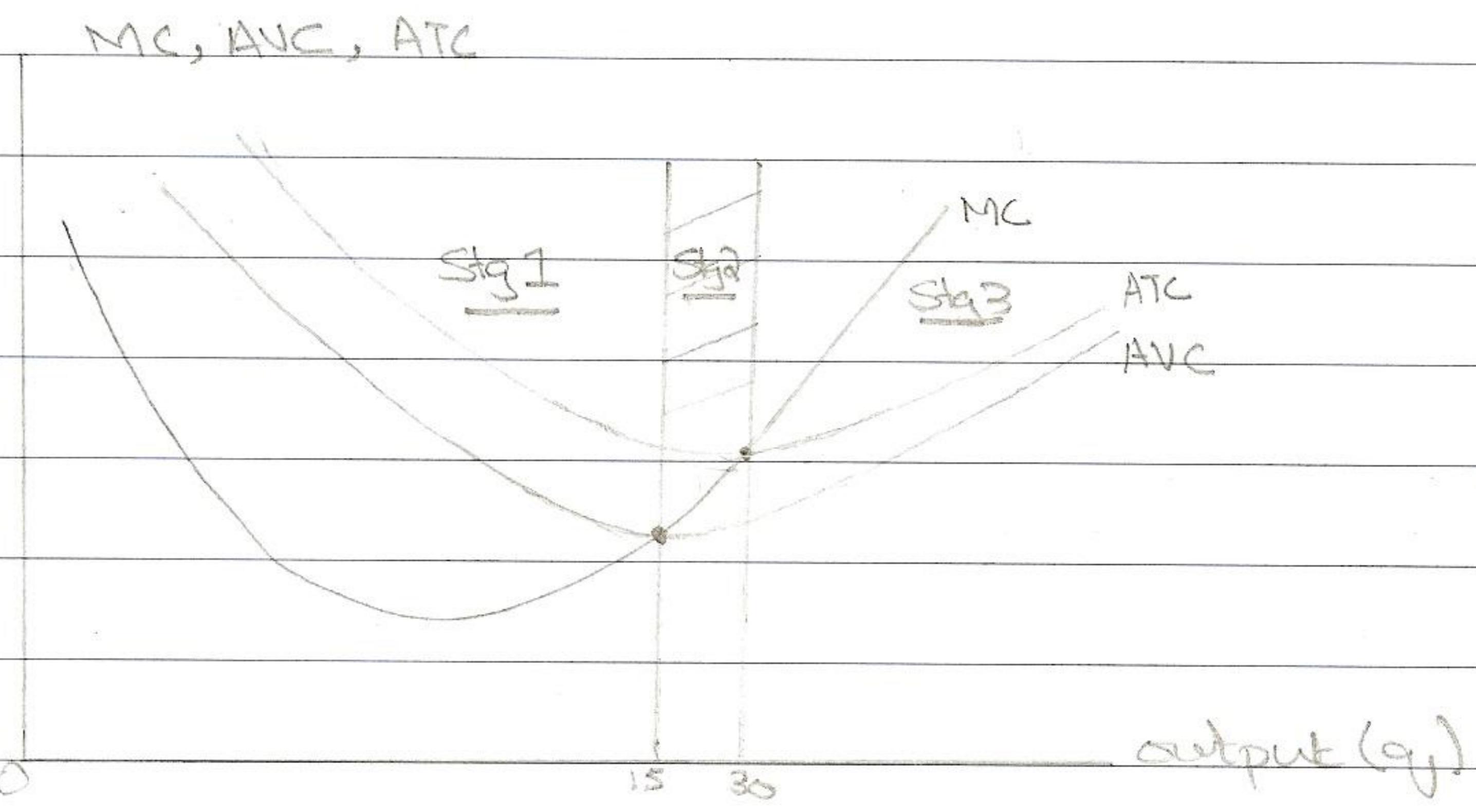
Date _____

The diagram above shows the relationship b/w Marginal cost and average variable cost. When Marginal cost is falling so is AVC but marginal falls so fast that its less than ATC. Conversely when marginal cost starts rising AVC also rises but marginal rises so fast that its more than AVC.

This implies that marginal cost will intersect AVC at its minimum.

THE SAME LINE OF REASONING CAN BE APPLIED TO UNDERSTAND THE RELATIONSHIP BETWEEN MARGINAL COST AND AVERAGE TOTAL COST.

IF WE PLOT MC, AVC and ATC IT WILL APPEAR AS FOLLOWS:



In the diagram above the following point must be taken into account.

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2. The output level corresponding to lowest point of AVC is lower than ^{the} output level that corresponds to the lowest point on ATC.
3. The wedge b/w ATC and AVC keeps shrinking as output level rises. This is so because average fixed becomes a smaller fraction of average total cost however at no point ATC and AVC should intersect because AFC is always positive.

(36)

Law of variable proportions.

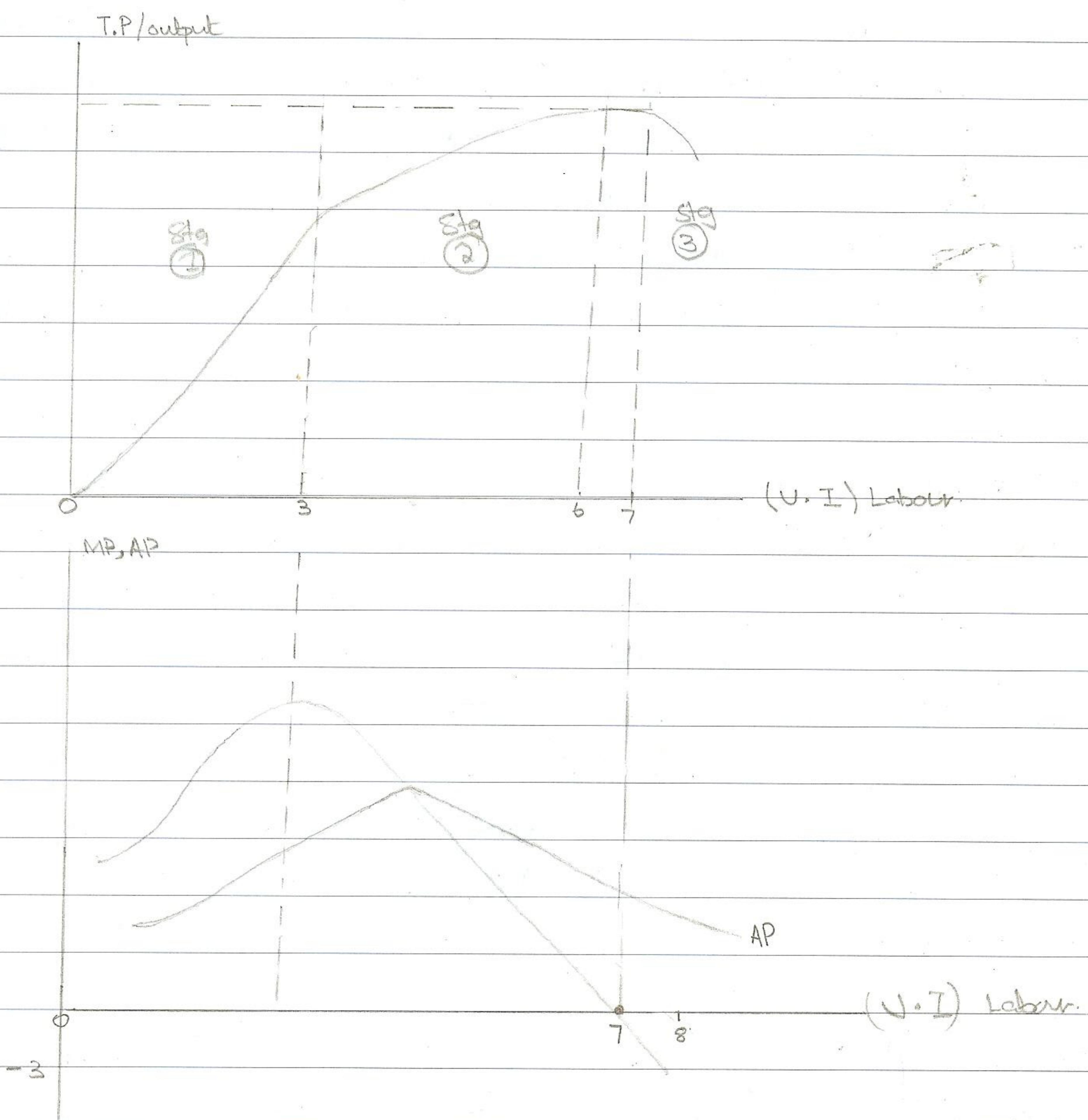
Date 23rd Aug '06'

Law of variable proportions is also a short term relation b/w input and output where atleast one factor of production is fixed and others can be variable. The law of variable proportions states the following "As we increase the quantity of variable input, holding atleast one factor constant, the output initially increases at an increasing rate then at a decreasing rate and after reaching maximum absolutely declines".

The following table shows the relationship b/w variable input and output according to the law of variable proportions.

Capital (fixed factor)	Labour (variable factor)	Output or total product	Average product	Marginal product
10	0	0	0	
10	1	7	7	7
10	2	20	10	13
10	3	39	13	19
10	4	55	13.75	16
10	5	66	13.2	11
10	6	70	11.66	4
10	7	70	10	0
10	8	67	8.37	13.25 (3)

Date _____



Marginal product is defined as change in total product upon change in quantity of labour.

Marginal product of labour tells us how much addition to total output has been made by employing an extra unit of labour.

Law of variable proportions is divided into 3 distinct

(38)

Date _____

~~X~~
Stage 1: In this stage as we increase the amount of variable input (Labour), total output increases at an increasing rate and both average product and marginal product rise. This stage is called "Increasing marginal returns" and it applies to the range of one to three of the variable input.

Stage 2: In this stage as we increase the amount of variable Input (Labour) total output increases at a decreasing rate and both average product and marginal product decline. This stage is ~~is~~ called "Diminishing marginal returns". This is the most predominant stage and due to this the law itself is sometimes referred to as law of diminishing returns.

Stage 3: In this stage increasing variable input brings about an absolute decline in output. This will only occur when organisation becomes extremely overstaffed and inefficient ~~and along~~ with a very poor poor capital to labour ratio. No rational entrepreneur will ever take production into this stage because it would be unprofitable in maximizing losses instead.

BS
9.9.9
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K.2021

extra set of notes

(39)



Relationship between marginal product and average product.

Marginal product determines the behavior of average product. If marginal is rising above average, average will rise. So both marginal and average tend to move in the same direction however the rate at which they move is different because marginal is always faster than Average. "So when MP is rising AP also rises but MP is more than AP ^{and} ~~but~~ when MP is falling AP also falls but MP is less than AP. This implies that MP cuts AP at its maximum.

(40)



Long Run cost

Date 25th Aug 06'

As mentioned earlier long run refers to a time frame in which a firm can alter its output by simultaneously changing all factors of production holding no factor constant. The long run relationship between Input and Output is explained thru returns to scale or economies and diseconomies of scale.

In returns to scale we look at the percentage change in input and % change in output & brings about. If a change in inputs brings about a more than proportionate change in output then a firm is said to have increasing returns to scale. Conversely if an increase in inputs leads to a less than proportionate increase in output then the firm is experiencing decreasing returns to scale.

Finally if a change in inputs leads to a proportionate change in outputs then there are constant ~~retur~~ returns to scale.

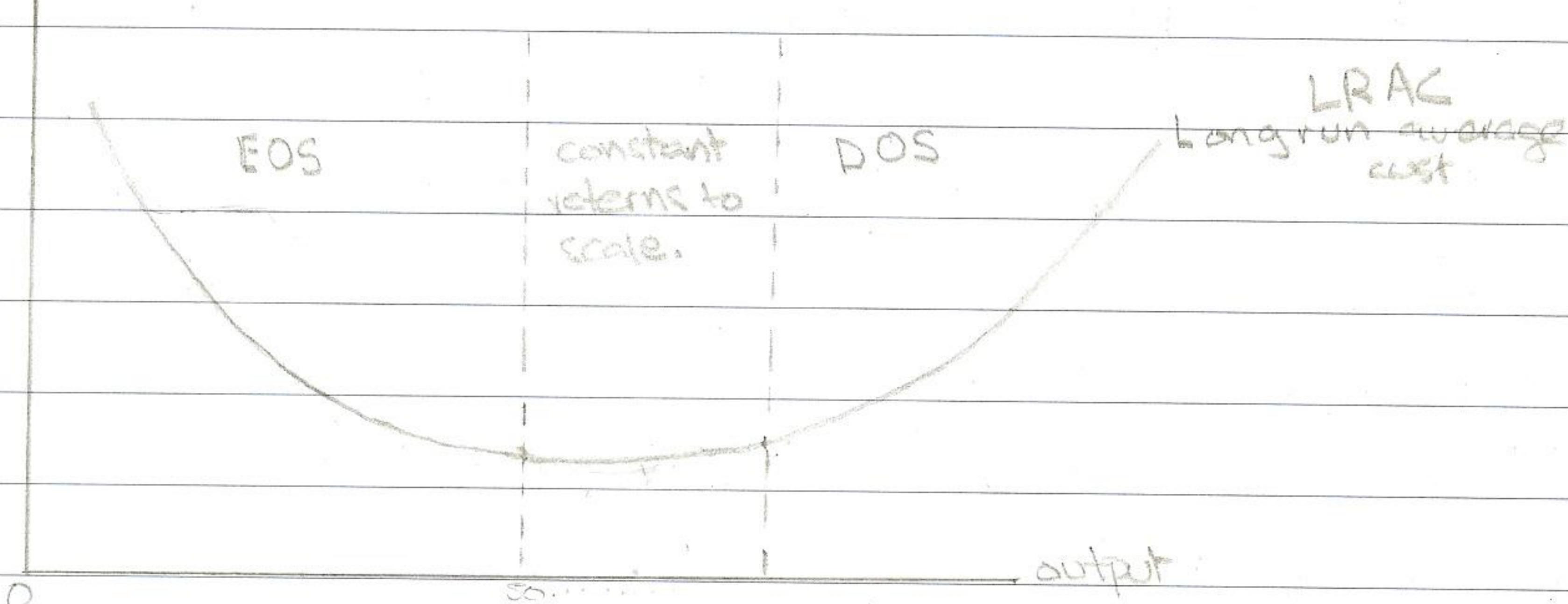
The concept of increasing returns to scale is consistent with economies of scale whereas the concept of decreasing returns to ~~scale~~ scale is consistent with diseconomies of scale. When a firm experiences a constant return to scale, it means there are neither

Date _____

The following table illustrates these concepts:

% Δ in all inputs	% Δ in output	EFFECT ON PRODUCTION	EFFECT ON AVERAGE COST
(10 20)	50 40)	Increasing returns to scale or economies of scale	Falling
30	30	constant returns to scale	constant
40	20	Decreasing returns to scale or diseconomies of scale	Rising
50	10		

AC (long run)



(42)

Economies and Disconomies of scale Date 24th Aug 06'

From the graph above it's clear that when long run average cost falls, firm experiences economies of scale, and when it rises it firm experiences dis-economies of scale.

Economies of scale can be classified into internal and external economies. When a firm is able to reduce average cost of production because of internal efficiency and becomes more cost effective compared to its rivals

it is called an internal economy of scale.

On the other hand if there's a favorable change in external factors which enable the entire industry to reduce its cost of production then it's called an external economy of scale.

Internal economies can be further classified into the following:

1. Buying economies or commercial economies
2. managerial economies
3. financial economies
4. Technical economies
5. Marketing economies
6. risk bearing economies

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Buying economies: These economies of scale are realized by firms with large scale production. These firms buy raw material in bulk which entitles them to significant discounts from suppliers of raw material. In some cases firms also buy the source of raw materials (vertical integration backwards) and are therefore able to reduce raw material cost per unit. This in turn leads to lower cost of production per unit which allows the firm to sell at a slightly lower price and grab a large share of the market. For eg DeBeers in South Africa owns most of the diamond mines and enjoys an absolute monopoly due to successful backward integration.

Managerial Economies: These economies are also realized by large scale firms and they are a direct result of division of labour.

Division of labour can be applied to factory processes and production lines where each person specializes in a job which is a part of an entire process. For example labour on car assembly line may specialize in a particular task such as welding the doors, fixing the boot etc.

Division of labour can also be applied to service industries where highly skilled labour is equivalent to more output.

(44)

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Whatever the case maybe division of labour increases productivity and reduces cost of production.

Jonal

Date 28th aug 06'

Financial economies: are also realized by large firms because they have a large asset base which can be used as security against the loans taken by the company. As a result the risk element is eliminated and creditors to the companies are willing to extend loans at a much favorable interest rate compared to those companies those are small and cannot provide security against loans. Lower rate of interest means lower cost of production and lower cost of production leads to lower prices which means greater market share to sustain large scale production.

Technical economies: are direct consequence of technological advancements or investment by companies in research development and innovation. Improvement in technology always brings about increase in productivity and efficiency as a result cost of production declines and firms are able to sell their goods and services at relatively lower prices. For eg. a lot of automobile manufacturers have camp invested in completely automated assembly lines which not only increases standardization but also increases output per labor unit of

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the short run. But always results in huge cost savings in the long run.

Marketing economies: When a firm is able to expand scale of production and reduce cost per unit through advertising and promotion it is referred to as marketing economies of scale. A successful marketing campaign can increase demand so much that a firm is able to invest in bigger plant size and consequently buy raw material in bulk. In the long run this will lead to ~~not~~ reduction in cost of production and result in economies of scale. Ideally the cost savings due to successful advertising more than offset that expenditure incurred upon advertising which will reduce average cost per unit.

Risk bearing economies: are based on the concept of diversification. Sometimes large companies produce a series of related products so that if they do not do well in one market segment, they can compensate themselves by selling more in another segment. e.g. Nestle: Dweker butter, milk, yogurt, and ...

Date _____

that its not doing very well in the milk segment it can switch focus on yogurt and butter without any significant alteration in ~~process~~ production and cost because of common raw materials and processes. In this way the firm will be able to average out the market risk and prevent losses.

market
100' 20' 50'

1 - S.
1 - D