An Introduction to Microeconomics
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Lecture – 116
An example obtaining the short run supply function

Let us begin with an example to understand shut down as well as short run supply function. So, the example is taken from a book called Microeconomics, modern introduction by Andrew Scotter it is a nice book. Although not referred in the syllabus, but you can use this book if you are more mathematically inclined. So, here is the example.

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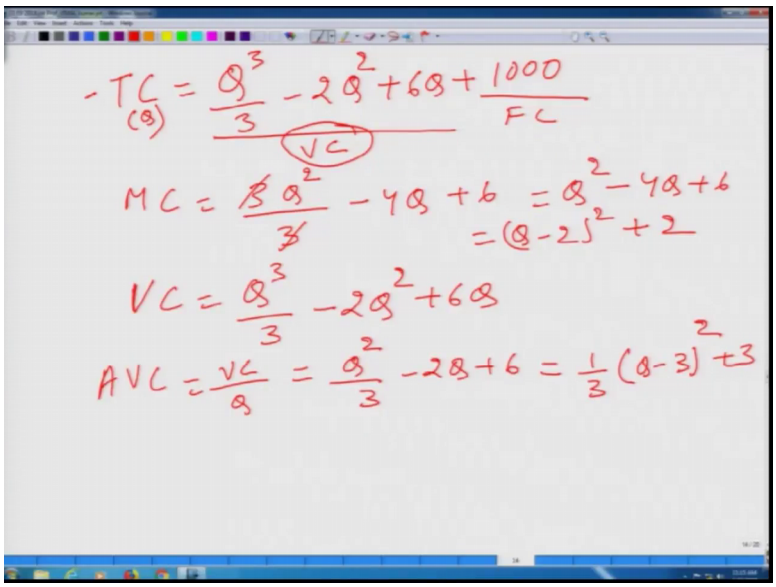

What we have is total cost is given by Q to the power cube by 3 minus 2 Q square plus 6 Q plus 1000, ok. So, TC, TC is a function of Q, as Q changes total cost changes. If you pay attention this is the fixed cost part and this is the variable cost part. If we are familiar with the rules of calculus we can differentiate this total cost function with respect to Q and obtain marginal cost. So, the marginal cost is going to be 3 Q to the power 2 divided by 3 when you differentiate Q cube then you get 3 Q squared minus 4 Q plus 6 which is basically Q square minus 4 Q plus 6 and this we can write it as Q minus 2 square plus 2 ok.

Similarly by differentiating this total the variable cost part of the total cost function we can sorry not by differentiating by dividing it by Q because what is the variable cost variable cost is Q to the power 3 divided by 3 minus 2 Q square plus 6 Q. So, average variable cost is going to be VC divided by Q and if we do that this is what we will get and this can be rewritten as. So, this is what we have.

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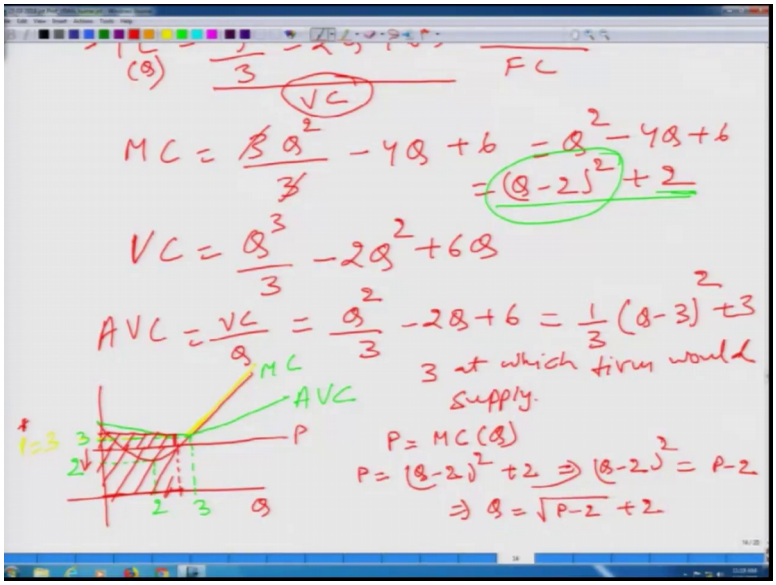

Now, we need to figure out if we draw it how it is going to look like. Let us say that here we have Q here the marginal cost decreases and then it increases and average variable cost average variable cost it is like this. Of course, it is not very accurate description and its clear from its clear from this equation that marginal cost function this is marginal cost and this is average variable cost. The marginal cost attains minimum at Q equal to 2 this component has to be positive or non negative that is more appropriate. So, the minimum value it can take is Q is equal to a minimum value it can take is 0 which happens at Q equal to 2 and at that marginal cost is 2. So, we can say this is true and here it is 2.

And from here we can say that average variable cost is attained when Q is equal to 3 ok, and at that label this average variable cost is 3. What we have learned that the supply function is upward sloping part of the marginal cost function which lies above the average variable cost. So, if we take this yellow colour this gives us the marginal cost ok. And clearly that if and at this the P has to be equal to 3 and this is the minimum value of

price minimum value of price at which firm is willing to supply because see what happens if P comes down below 3 what would happen let us take a look at it.

At this at this price firm is going to earn this much of revenue and how much firm will have to pay to produce this much of output that will of course, not the whole cost, but this is the variable cost part even the variable cost part is more than the total revenue. So, this is extra that firm will have to spend and that is why firm would not be interested in supplying at price lower than 3. So, the minimum price is going to be 3 at which firm would supply, ok.

So, now it is clear we Let us again pay attention to the marginal cost and what we have said that how did we obtain the supply function in short run, by equating P to marginal cost. So, from here we can write P is equal to Q minus 2 square plus 2 from here if we solve it what do we get Q minus 2 square is equal to P minus 2 and this can be rewritten as root under P minus 2 plus 2 and this is the supply function. Of course, we have to add that P has to be greater than or equal to 3 then only this according to this function firm would supply in the market.

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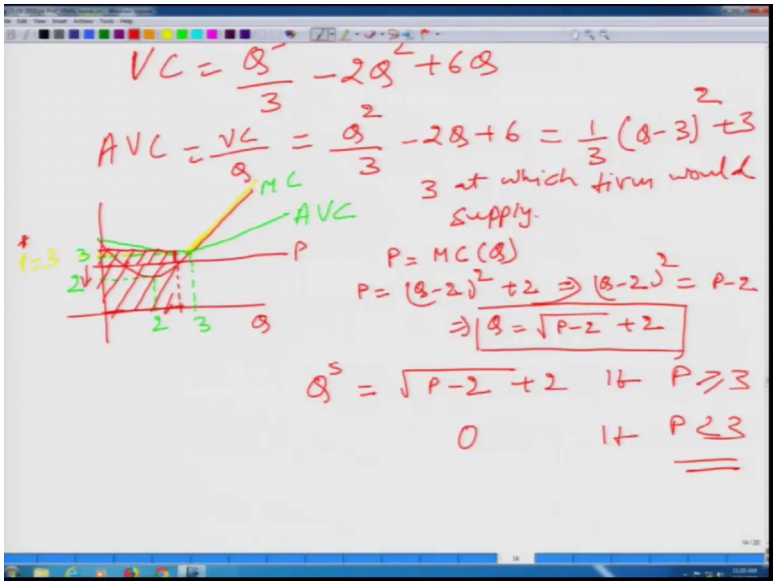

If P happens to be less than 3 then this firm would not supply anything in the market. So, we can say the supply function is equal to P minus 2 plus 2 if P is greater than or equal to 3 and 0 if P is less than 3. So, this is the example very clear that firm would like to shut

down its operation if P is less than 3, for a simple reason that the firm is not even able to recover the variable cost. So, firm would prefer to shut down the operation.

Thank you.