Lecture - 56
More on Utility Maximization

Let me justify it, forget about this calculus; just remember these simple things.

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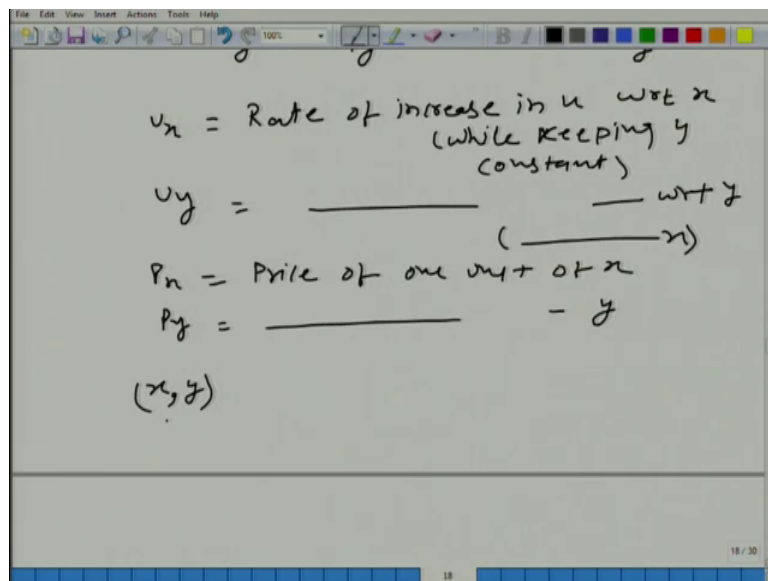
That Ux is nothing but rate of increase in x with in u with respect to x.

Student: y sir.

While keeping y constant and similarly Uy; rate of increase in u with respect to y while keeping x constant this is what Px you remember is price of?
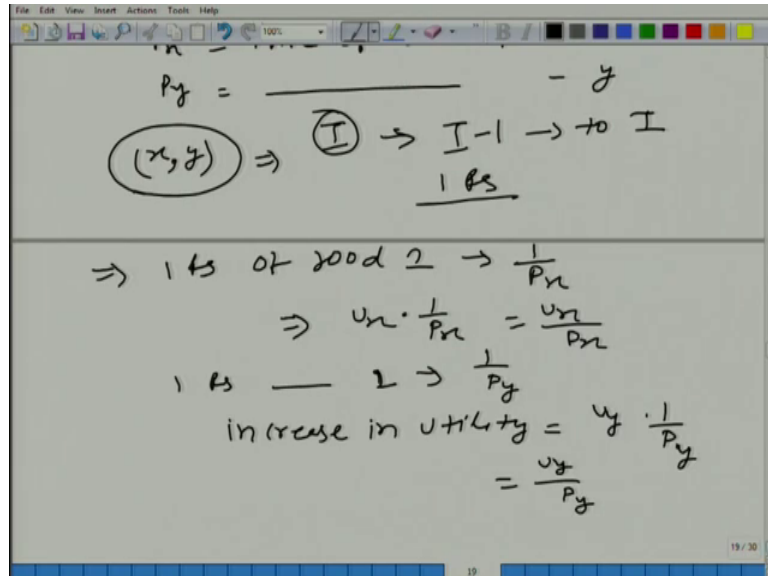
Student: x

Of?

Student: 1-unit f x.

One unit of x and Py is price of one unit of y. Now, let say you are consuming you want to maximise your utility and you are consuming a particular bundle x and y. Fine I do not

know how you have reached to because there, we talked about how you would reach to x and y.

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Now, let say I we do not know how you have reached to this x and y, but if you are consuming let us say you are consuming x and y at the optimal level. Then what does it mean? Let say, if you have I income and think about this I minus 1 to I rupee means last 1 rupee last 1 rupee that you have spent on either good 1 good or good 2 or on both of them.

Let us say if you have spent this 1 rupee on good one. How many units of good one you can get 1 by Px?

Student: Yes sir

1 by Px and how much will be the increase in utility?

Student: By dx

Ux.

Student: Ux

Ux multiplied by 1 by Px 1 by Px and if you have spent this 1 rupee on good 2 how many units of good 2 you can buy?
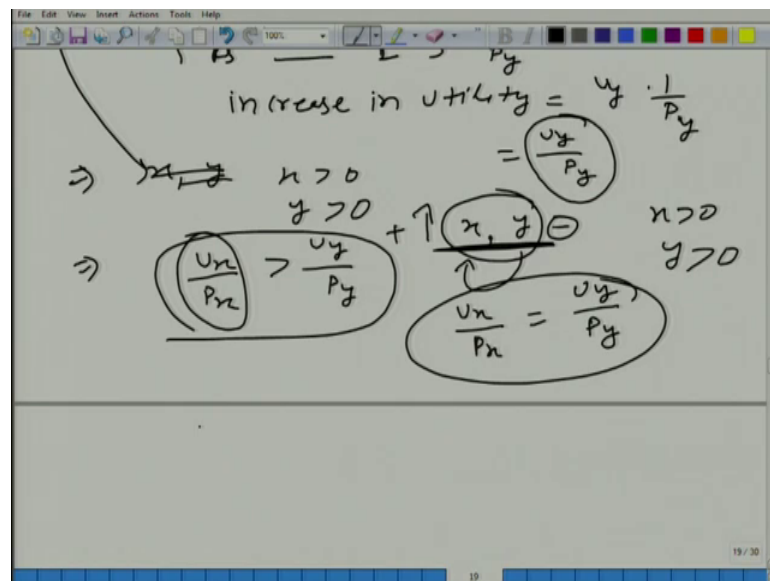
Student: 1 by

1 by Py what will be increase in utility because of this?

Student: (Refer Time: 02:54).

Uy by Py fine is this clear?

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Now, let us look at it, since let us say let us assume that x and y, x is greater this x. This x, is greater than 0 equal to 0 greater than 0 and y is also greater than 0 fine. Let say, if Ux by Px is greater than Uy by Py, just I am saying this is one of the possibilities. There are 3 possibilities either this is greater than first one is greater than the second one or equal or or less let us say this is the possibility fine.

And what you are doing? Is you are consuming positive amount of x and positive amount of y. If this is the case, what you would do? That you would increase consumption of x and decrease the consumption of y. X would go up and y would go down. So, then in this case x comma y cannot be the optimal bundle. Why? Because if this is true you will have tendency to increase x and decrease.

Student: Decrease

Tendency to decrease y, why? Because 1 rupee is bringing you this much change in the utility, this much change in the happiness, this much change in the satisfaction. If you

spend 1 rupee on good one, you get 1 by Px unit of good one and rate of increase in utility rate of change in utilities Ux. So, total change in utilities Ux by Px and similarly if you spend your 1 rupee on good 1, good 2, this is the change in utility and if Ux by Px is greater than Uy. By Py then what it means is that spending the last rupee on good one gives you higher utility, then spending the last rupee on good 2 fine is it clear?

So, what you will do? You will spend whole last rupee on good one. Then what will it lead to it will lead to increase in x and decrease in y and you will keep on doing you keep on moving your spending on from good 2 to good one, as long as this is true and vice versa.

So, at the optimal level if you are consuming the positive amount of good one and good 2. Then, Ux by Px has to be equal to Uy by Py is it clear? Remember, what is the cashier? That x and y both has to be both have to be positive if you hit 0 for one of the good you cannot decrease it any further that scenario we will talk about little later.

But if at the optimal level x is greater than 0 and y is greater than 0, then this has to be true. This we independently derived, with argument not using mathematics, this also we have derived using mathematics earlier, here. This is this can lead to this example that marginal rate of substitution should be equal to the slope of the budget line.

Now, let us look at it from the third angle, with help of example is it clear with help of example. We are doing the same thing again and again from different angles, different viewpoints, where we are talking about the same thing.
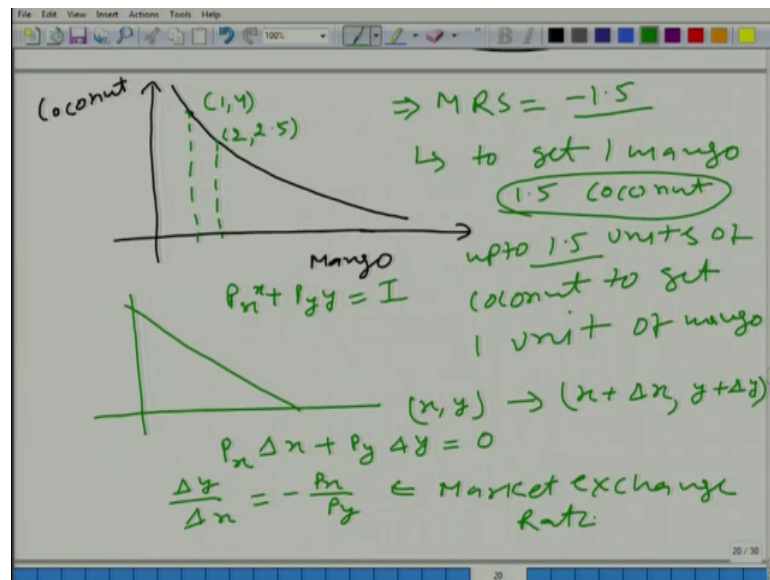
Let say remember the example that I gave you mango and coconut. Let say this is the indifference curve and here we are this is the 1 comma 4, 4 comma 1 sorry.

Student: 1 comma 4

1 comma 4, 1 comma 4 fine

Let us say this is 2 comma 2.5 just for example, to get one unit of mango what it means is again if we calculate the marginal rate of substitution what it is equal to?

Student: Minus 1.

Minus 1.5 what it means in word that to get to get one mango.

Student: Willing to sacrifice

Mango you will be willing to sacrifice 1.5 coconut fine.

Student: 1.5

Let us consider another scenario, if I come and tell you that to get one mango you will have to sacrifice only one unit of coconut. Will you exchange?

So, what this means, what this means is that you are willing to give up up to 1.5 units of mango units of coconut to get one unit of mango. Is it clear? Fine, anything you know

anything less than 1.5 unit, you would happily accept. This is your inbuilt opportunity cost, it is not exactly opportunity cost, but you use the word that is why I am using it.

But here it is opportunity cost, if we looked if we look at the budget line. Here we look at the budget line, what is this? Px plus Px x Py y is equal to I. And from we move to1 1 comma 4 2 2 comma 2.5 in other word from x comma y we are moving to x plus delta x and y plus delta y fine.

What is happening? Px plus Px delta x Py delta y should be equal to 0 because budget constraint has to be satisfied and we also know because of monotonicity the optimal bundle we will find on the budget line not inside not at any interior inside point fine is it clear?

Now, what does it mean let us let me write it here delta y by delta x is equal to Px by Py this is market exchange rate this is market exchange rate of course, we are talking about 2 good world. So, there is no money here involved you are battering you are exchanging mango for coconut and coconut for mango. And this is the market exchange rate that we have obtained.

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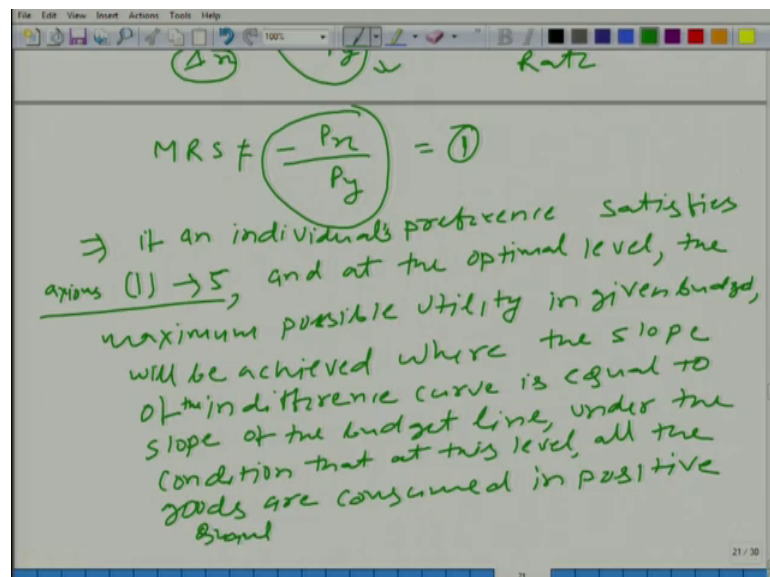
Now, let us consider a scenario where MRS is not equal to minus Px by Py what it means here to get market rate to get one more unit of mango you will have to give a Px by Py units of coconut this is opportunity cost. This is opportunity cost, because you have 2

activities available either you consume mango or consume coconut. So, it is the cost of opportunity cost is the cost of value of the best alternative for gone. So, if you are consuming mango what you could have done? You could have consumed coconut. So, it is value of coconut. So, this can be used as the opportunity cost.

What did we obtain here? How much this person is willing to pay for one unit of mango? Up to 1.5 units of coconut. Now, let say minus Px by Py is 1 minus Px by Py is one what it means that in market you can exchange one mango for one coconut or one coconut for one mango.

Now, in this scenario, when you are marginal at that point your marginal rate of substitution is 1.5 and your slope of the budget line is 1, it cannot be optimal. Why because what you are saying to get one unit of mango you will be willing to give up up to 1.5 units of coconut. And you will be at the same indifference same utility level.

So, what you would do here? Because, the the exchange rate is just 1 is to 1, what you will do you will happily you will happily give up what one unit of you will happily get one unit of mango, because think about it again. What will you do? The marginal rate of substitution is 1.5 you will be willing to give up to one mango you will be willing to give up. Up to 1.5 units of coconut, but. So, you in your mind in your mind to satisfy your for your happiness to keep you at the same utility level, you are willing to sacrifice up to 1.5 units of coconut just look at it here at this point.

Let us say because of some reason for some reason, you have to sacrifice more than 1 unit of 1.5 units of coconut where will you end up to get one more unit of you will end up somewhere here somewhere here. And this point is below indifference level. So, you will be at lower utility level.

But let us another condition would be that you have to give up less than 1.5 units of coconut, where will you end up? Somewhere here. On the same line, on this line on this line and you will end up here and you will have higher utility. So, that is what happening, you will happily give up 1 unit of coconut to get one unit of mango and your utility will be higher. So, that bundle cannot be optimal, what we are talking about the condition for optimality. So, in the other direction you would reach to the same conclusion so at only 1 point you will have.

Student: Maximum.

The maximum possible utility given your budget constraint, where your marginal rate of substitution is equal to market exchange rate or in other word where the slope of your indifference curve is equal to the slope of budget line.

But remember whatever we have discussed here the scenario what we are assuming that x and y at the optimal level they are greater than 0. Is it clear? This optimality criteria is clear, the tangency criteria what it says? That if let me say if an individual preference satisfies axiom one to how many axiom that we have discussed? 5 axiom 1 to 5 1 to 5 and at the optimal level what is optimal level the max that is the maximum possible possible utility in given budget yeah.

Student: Sir, if we are following strongly following all these axioms. We strictly following 1 to 5 axioms then is it necessary to specify that x is greater than 0 and y greater 0 because

We do not have to specify then, we in that case we do not have to satisfy it will automatically be satisfied. What we are saying at the optimal level the maximum possible utility in given budget will be achieved achieved, where the slope of indifference curve is equal to the slope of of the budget line. Budget line under the condition under the condition; that at this level, level all the goods are consume in positive quantities that is very important.