Introduction to Market Structures
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Lecture - 2
Utility Maximization and Derivation of Demand Curve

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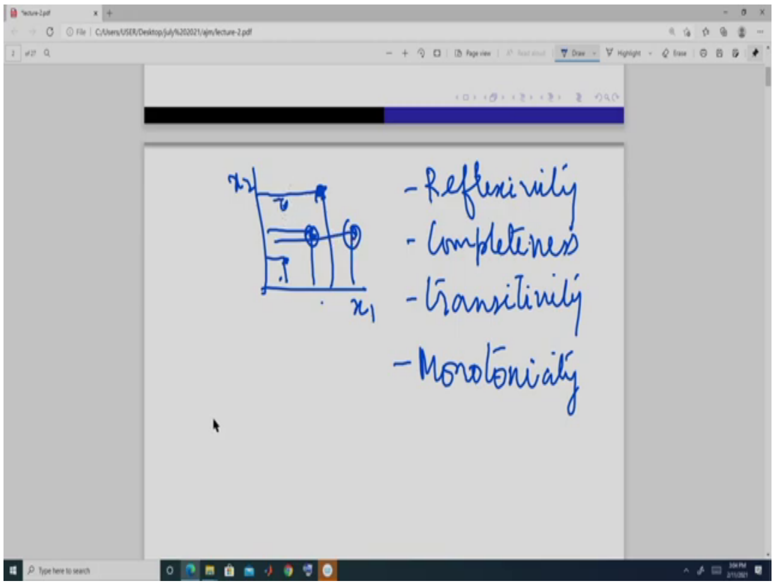

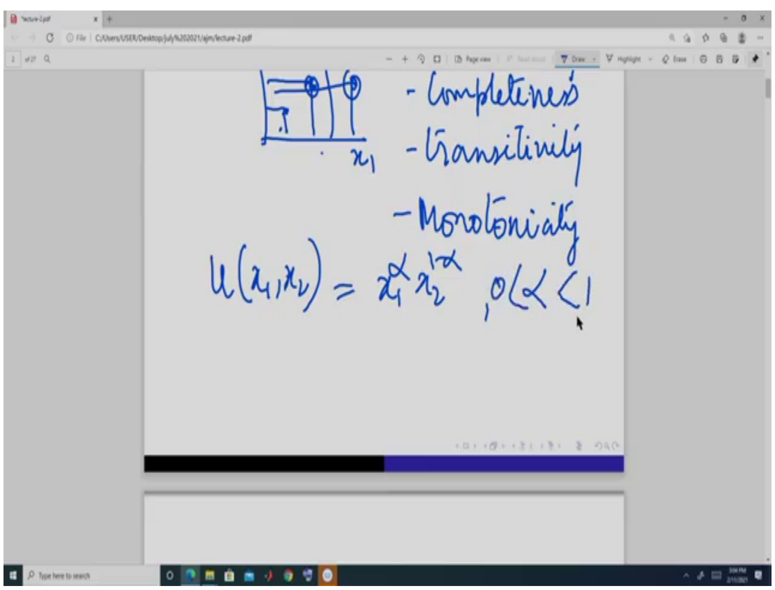

Hello, everyone, welcome to my course Introduction to Market Structure. So, in this second lecture, we will first recap what we have done in the first lecture. So, in first lecture we have defined preferences and we have done only for two goods suppose, good 1 and good 2. So, these points in the positive quadrant represents the consumption bundle and we have defined certain assumptions on these preferences a consumer has over this bundle.

So, first is like reflexivity, we have defined reflexivity that bundle should be at least as good as itself, then we have defined something like completeness which says that we should be able to compare all the bundles which are there in this positive quadrant. Then, we have like transitivity. Transitivity says that if a bundle x, bundle y and bundle z suppose we have three bundles and x is at least as good as y, y is at least as good as z, then x should be at least as good as z.

So, one implication of this is that if x is preferred to y and y is preferred to z, then it implies that x must be preferred to z. We cannot have z preferred to y; z preferred to x. So, in that case, if we have z preferred to x, then we will not be able to choose from this three bundles because we will go on cycling.

Now we have introduced another property and that is monotonicity, and monotonicity gives us that if we have a bundle and if the quantity in that bundle is greater than another bundle, then we choose that bundle in which quantity is greater. So, suppose if we take this bundle and this bundle, we will choose this bundle or prefer this because here both the goods are greater than this.

So, here compared to this and this, we will choose this one, if compared to this and this we will prefer this one. But compared to this and this, we cannot say which one we prefer based on simply under monotonicity, right. Next, we assume that the preferences are continuous, so, it means that there is no jump in it and we do not go into details.

So, based on these five assumptions, we can say that we can define utility function over these bundles. So, utility function we have defined it something like this – U(x1, x2). So, if we are given a bundle like this, then we can assign some number to this bundle. So, one example is suppose, like this- $U(x_1, x_2) = x_1^{\alpha} x_1^{1-\alpha}$ where alpha lies between 0 and 1, this is a Cobb Douglas utility function.

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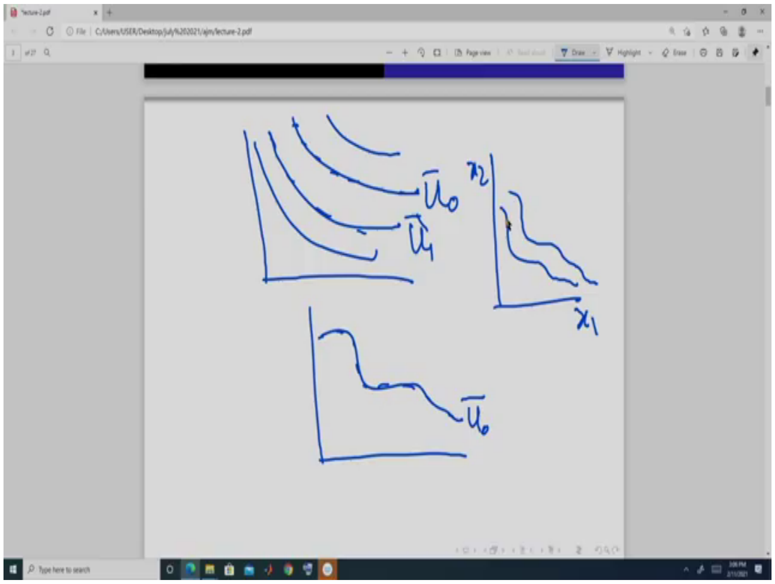

And from this utility functions what we have done, we have derived something called a set of indifference curve like this, where each bundle in this curve gives us same utility. So, this is same and then here we have got this is another a where we have got, now here the utilities are higher than this. So, these are something called indifference curves we have got this.

So, we may also get an indifference curve of this nature, right? where all these bundles give me the same utility like this, it is fixed. But from monotonicity what we have got that these utility indifference curves should be always downward sloping. It should be like this, like this, okay.

Now, if we have indifference curve like this, if our utility function is such that we generate this kind of indifference curves then we may have a problem while doing the optimization, that is maximizing utility subject to budget constraint. So, we do not want such indifference curves.

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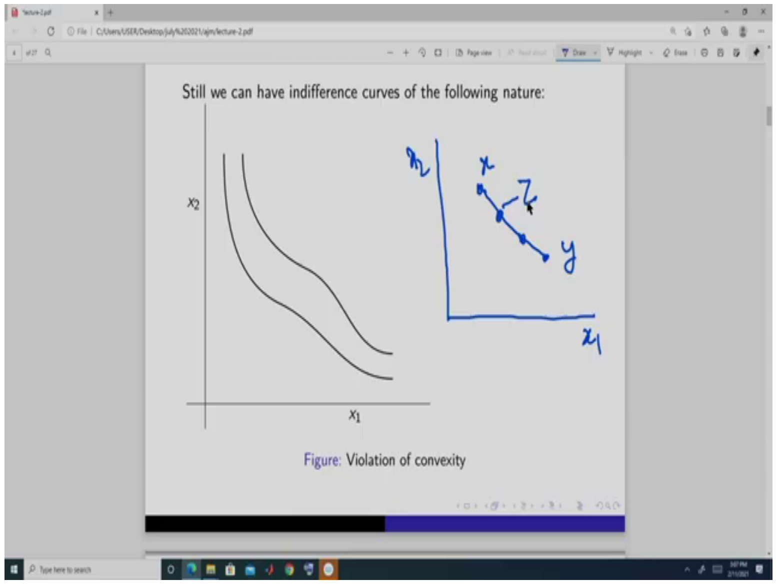

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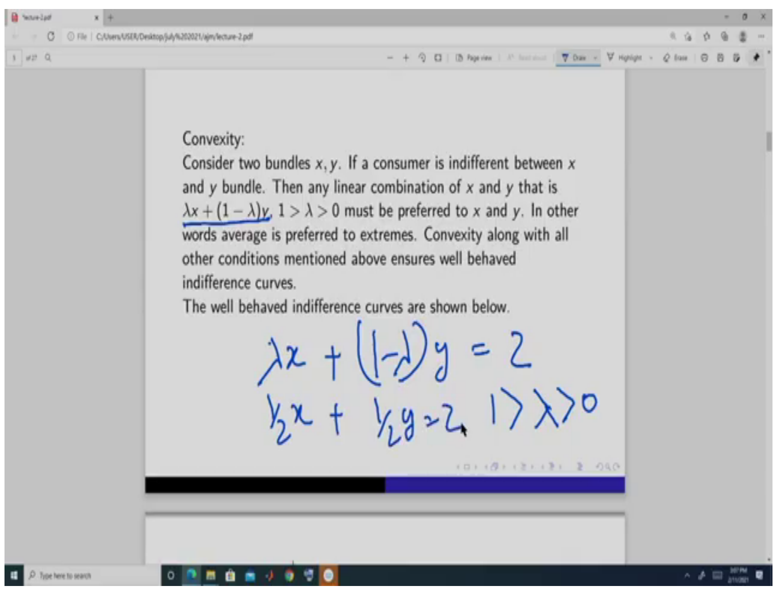

So, what we do, that we get these kind of indifference curve when we are violating another assumption and that is the assumption of convexity. What convexity says, it is something like this, that if we are in this a, given two bundle this is suppose x and this is suppose y, okay. Now, if we take any combination of this linear combination of this suppose we, so suppose this bundle or this bundle is suppose z. So, how do we have arrived at z?

We have arrived at z through this kind of linear combination- λx +(1-λ)y, 1>λ>0. What we have done, we have taken lambda fraction of x plus 1 minus lambda fraction of y and that has given me z. So, this lambda which always lies between 0 and 1, okay. Now, so, it can be like half of x plus again half of y give me z, it is something like this- 1/2 x+1/2 y= z, so, here we have got this. Now convexity says that this bundle should be at least as good as x and y. In fact, strict convexity says that this should be always preferred to x and y. So, it means that convexity implies that average is always preferred over extremes, okay.

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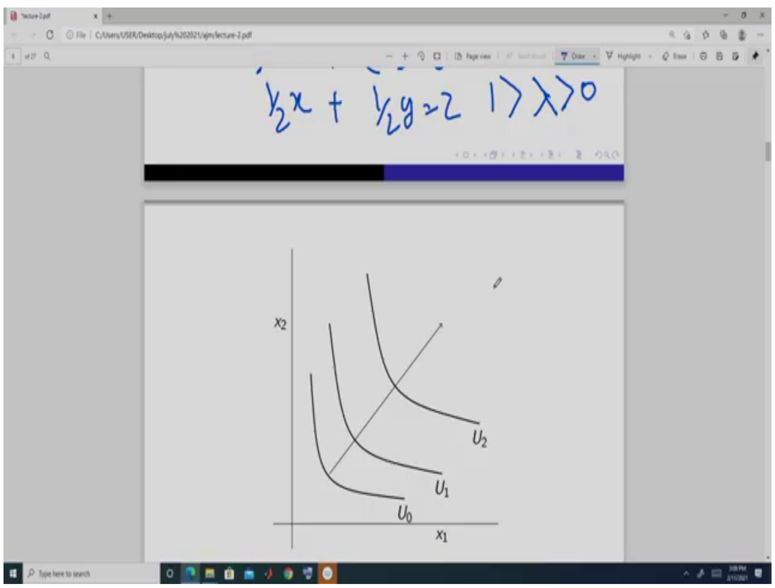

So, that is why we get this kind of indifference curves when convexity assumption is satisfied and these are something called an well-defined utility function. So, utility level is increasing from u naught to u1 to u2 and we get such kind of indifference curves, all these combinations give me same level of utility this gives me same level, but these are higher than this, right**.** So, we will assume that our preferences are well behaved, so, we will always get a well-behaved indifference set of indifference curves.

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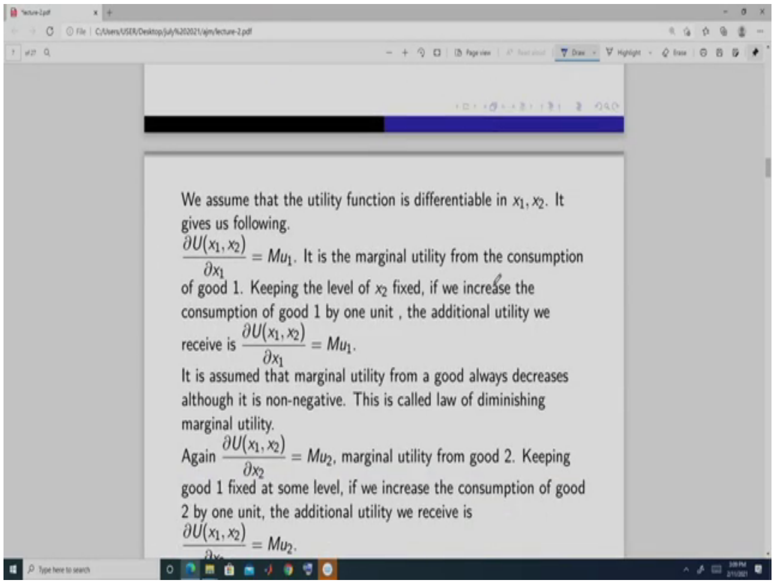

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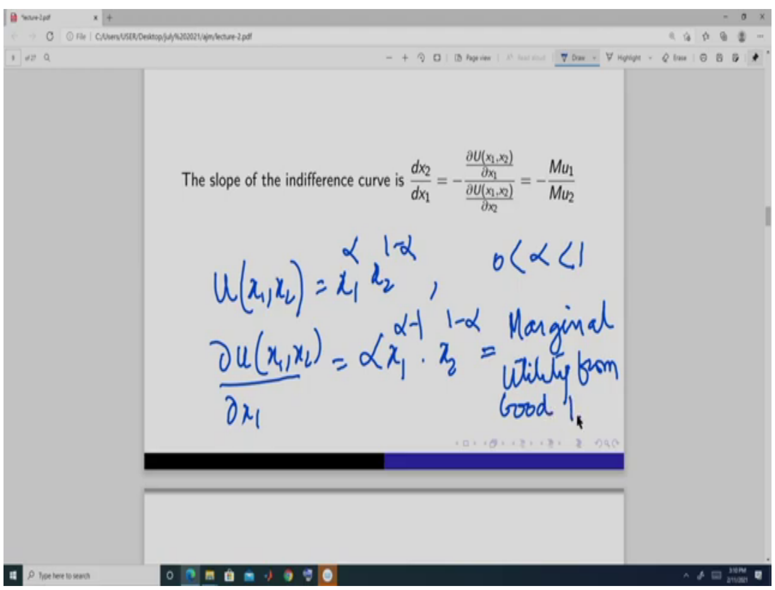

Now, further we will assume that the utility, so, because we can define our preferences through a utility function. So, if you give me a bundle, I know how much utility from, I am getting from that consumption of that bundle and that is given by a real number, positive real number, right. Now, here we further assume that these utility functions are differentiable.

So, if they are differentiable what does it means, that, if we are given a utility function like this- $U(x_1, x_2) = x_1^{\alpha} x_1^{1-\alpha}$ same as we have done earlier Cobb Douglas utility function where alpha lies between 0 and 1. Then it means we can take partial of this, we can take partial derivative of this and this is something called marginal utility from good 1, that is if we keep good 2 fix and if we increase the amount of good 1, then how much additional utility do we get? This is called marginal utility from good 1.

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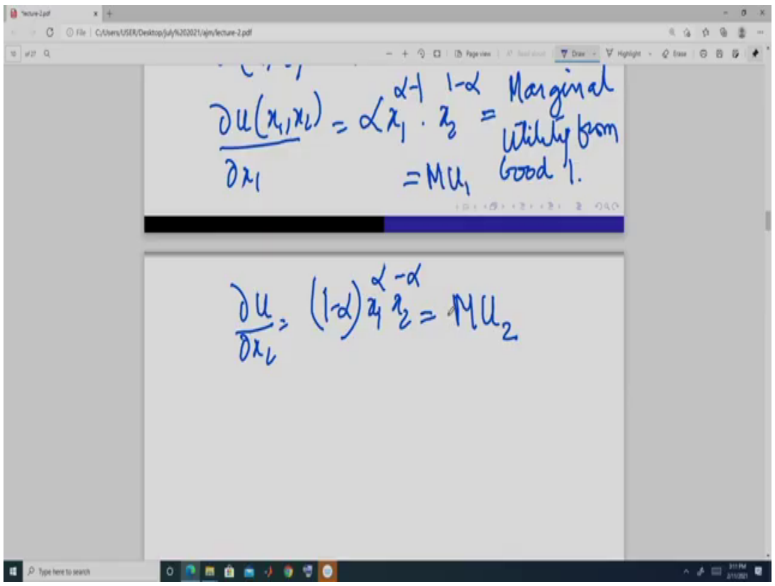

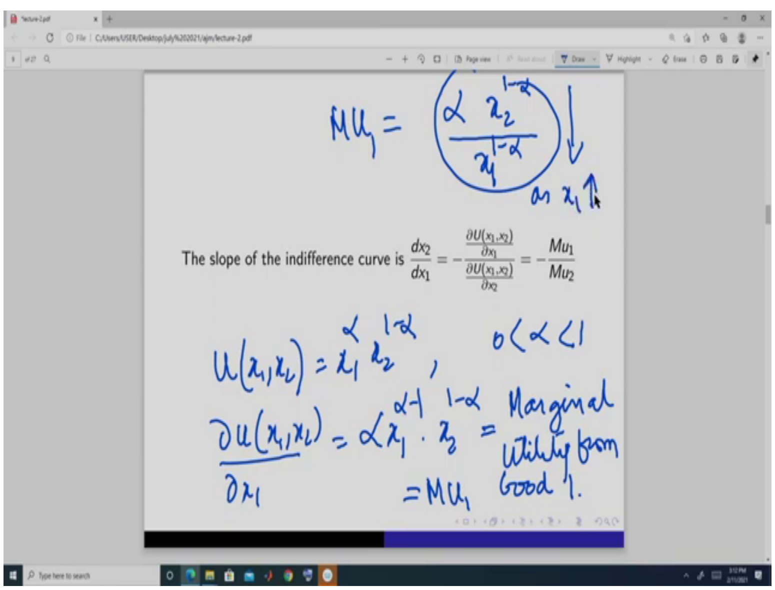

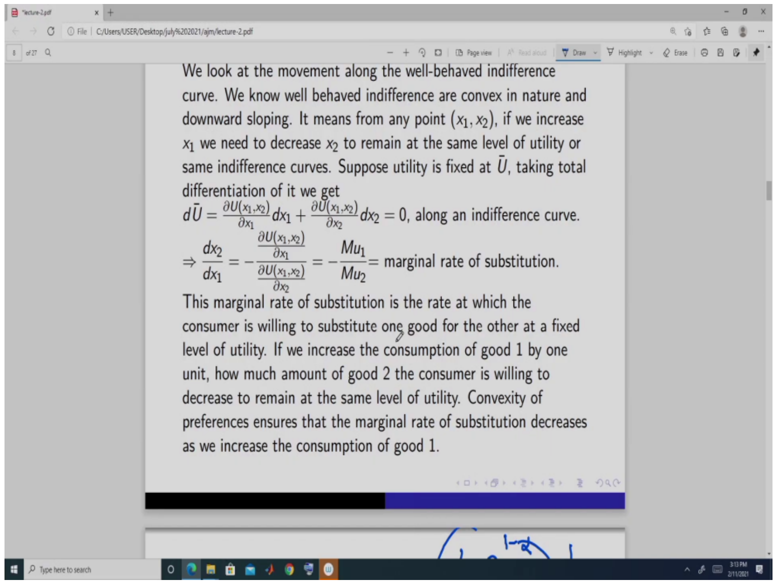

We look at the movement along the well-behaved indifference curve. We know well behaved indifference are convex in nature and downward sloping. It means from any point (x_1, x_2), if we increase x_1 we need to decrease x_2 to remain at the same level of utility or same indifference curves. Suppose utility is fixed at $\bar{U}$, taking total differentiation of it we get

$d\bar{U} = \frac{\partial U(x_1,x_2)}{\partial x_1}dx_1 + \frac{\partial U(x_1,x_2)}{\partial x_2}dx_2 = 0$, along an indifference curve.

$\Rightarrow \frac{dx_2}{dx_1} = -\frac{\frac{\partial U(x_1,x_2)}{\partial x_1}}{\frac{\partial U(x_1,x_2)}{\partial x_2}} = -\frac{Mu_1}{Mu_2}$= marginal rate of substitution.

This marginal rate of substitution is the rate at which the consumer is willing to substitute one good for the other at a fixed level of utility. If we increase the consumption of good 1 by one unit, how much amount of good 2 the consumer is willing to decrease to remain at the same level of utility. Convexity of preferences ensures that the marginal rate of substitution decreases as we increase the consumption of good 1.

Similarly, the marginal utility from good 2 is δu/δx2= $(1 - \alpha)x_1^{\alpha}x_1^{1-\alpha}$, *right,* and we represent it as Mu2 this is equal to Mu1, okay. So, we have something called law of diminishing marginal utility. What law of diminishing marginal utility says that, as we increase the consumption of one good keeping the amount of other good fixed, the marginal increase or the additional increase in utility is going to go down as we go on increasing good 1 or go on increasing good 2.

This marginal utility of good 1 should go on decreasing as we go on increase good 1 keeping good 2 fixed. So, it is obvious right**,** you will see what, you will see that this term is actually so, if I write it here you will see that the marginal utility of good 1 is actually this $MU_1 = \alpha\frac{x_2^{1-\alpha}}{x_1^{1-\alpha}}$, right**,** because 1 minus alpha is positive, alpha minus 1 is negative.

Now, as we go on increasing x1 this term is going to go down as x1 increases. So, this means that the marginal utility goes up and this is based on a law that is the law of diminishing marginal utility that is, if we keep the amount of good 2 fix and if we increase the amount of good 1 as we go on increasing good 1, the additional utility that we are going to get, it goes on decreasing.

Similarly, if we fix the amount of good 1, and if we go on increasing good 2 then the marginal utility or the additional utility that we get from consumption of good 2 is going to go down, it will remain positive, but it will go down. Now, since, we have assumed that our utility function is very well-behaved utility function and it is also differentiable, now, we can do some more operations on it.

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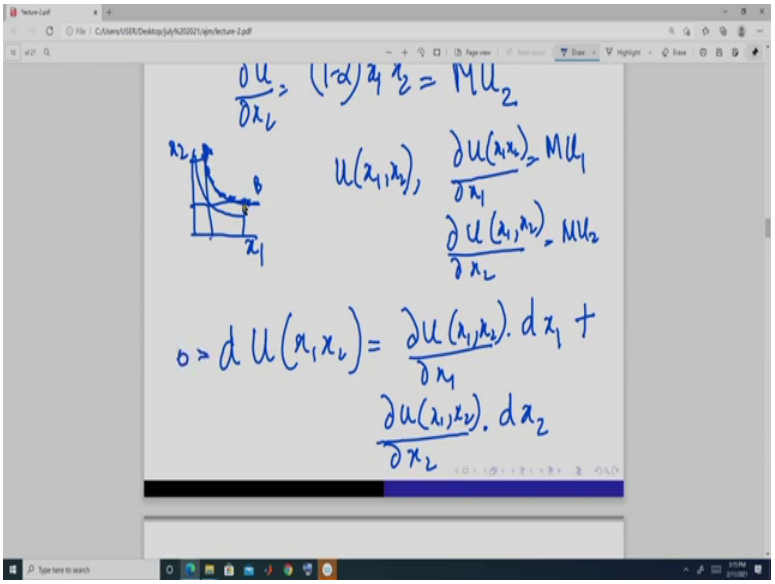

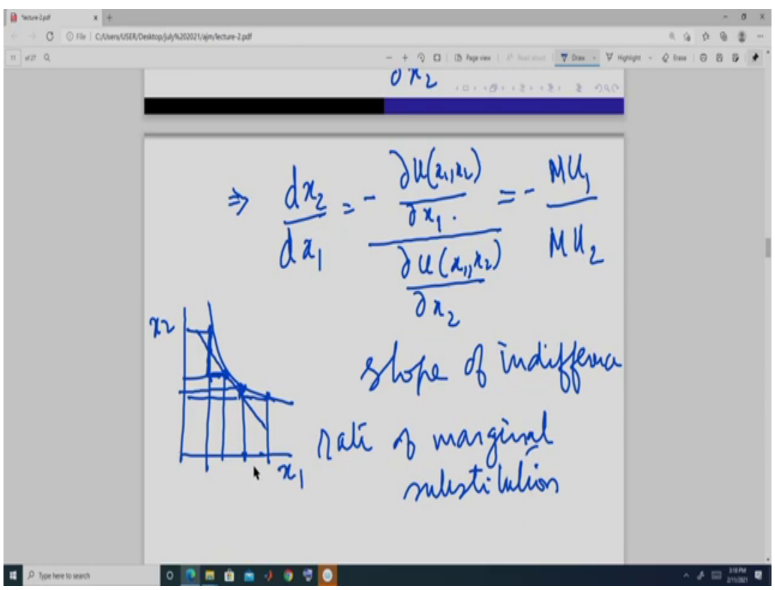

So, it is something like this that what, so, we will get a indifference like this indifference curves are going to be like this. Now, what happens if we move in this indifference from here to here. So, it means what, if we move from this point to suppose this point from A suppose to a point B our utility is not changing.

But our bundles are changing, right**,** here, it is a high amount of good 2, and low amount of good 1, here low amount of good 2, and high amount of good 1, right**.** So, what is happening in this movement? So, that is called movement along an indifference curve, and we will see that, it gives us something called a marginal rate of substitution and you derive it based on this.

So, our suppose utility function is this U(x1, x2), so, this utility function from this we will get this is what marginal utility of good 1, similarly, we will get marginal utility of good 2, right. Now, from this, if we take the total differentiation of this, what do we get? We will get this- $dU\left(x_1 x_2\right) = \frac{\delta U\left(x_1 x_2\right)}{\delta x_1}.\ dx_1 + \frac{\delta U\left(x_1 x_2\right)}{\delta x_2}.\ dx_2$. So, now, this is not changing when we are moving from point A to point B.

So, this gives us one important thing and that is, we get- $\frac{dx_2}{dx_1} = -\frac{\frac{\delta U\left(x_1 x_2\right)}{\delta x_1}}{\frac{\delta U\left(x_1 x_2\right)}{\delta x_2}}$, and this is equal to marginal utility of good 1 divided by marginal utility. This is called the slope of indifference curve and this gives us something called the rate of marginal substitution, the rate of marginal substitution. And this gives us that if I want to increase one unit of good 1 then how much unit of good 2, I must give up, so that I remain at the same level of utility.

So, it is something like this for this a, suppose this, so here when I move from this point to this point then if I increase x1 by this much I have to give up x1, x2 by this much to remain at the same level of utility. If I move from this, to this, then I have to give up this much only, okay. If you look at these two points you will see when I increase x1 by this much amount I have to give up only this much amount of x2.

So, what is happening? So, the amount of good 2 we are giving up that goes down as we go on increasing x1. So, this is the marginal rate of substitution goes on decreasing as we move downward in this indifference curve, okay. And this is actually what is, what we are willing to substitute, that is if I want to increase one unit of good 1, how much unit of good 2 I am willing to give up to remain at the same level of utility. This is willing what, because it is based on my preference, okay. Now, so, this much we are going to cover in a utility or the preference portion.

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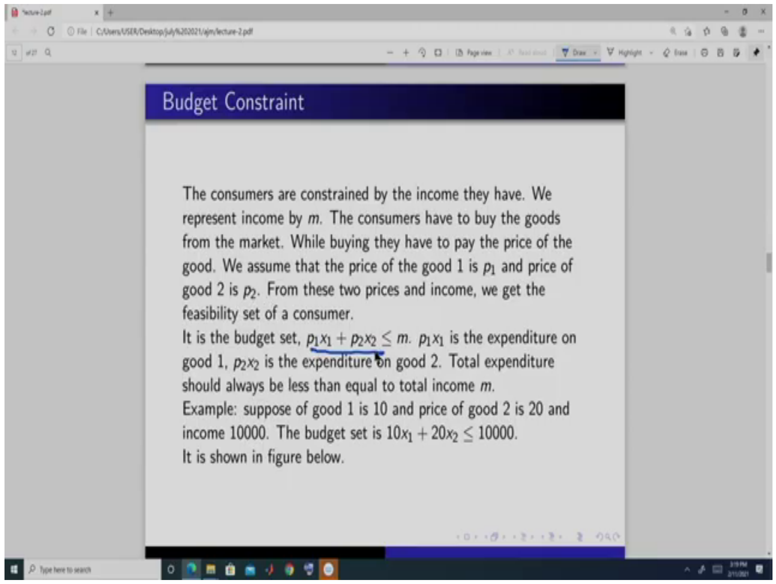

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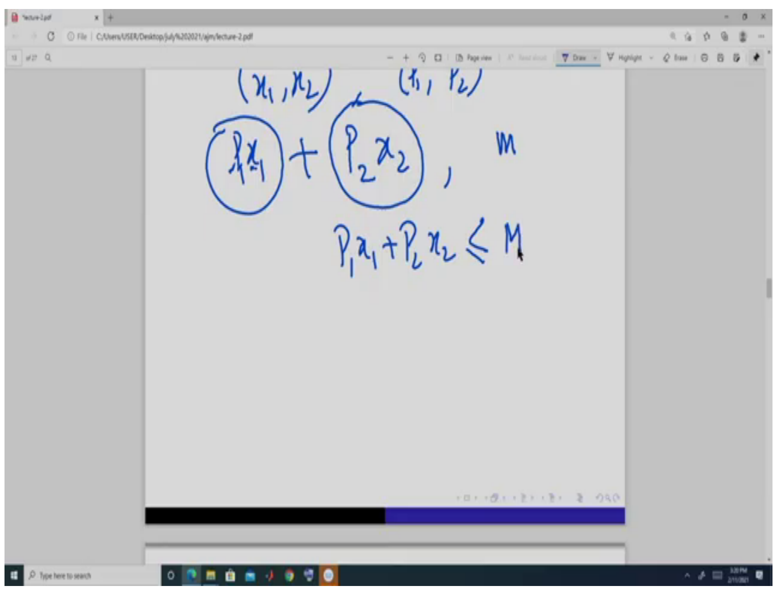

Next, we move to something called a budget constraint. What do we mean by budget constraint? Now, when we are buying goods in the market, we pay some price, we know we are in a world of two good that is good 1, good 2 and suppose price of good 1 is, p1 and price of good 2 is, p2, okay. Price of good 1 is p1 and price of good 2 is p2.

Then budget set is defined in this way- $p_1x_1 + p_2x_2 \leq m.$, where this amount p1 into x1 is the amount, I am spending on good 1, p is the price into the quantity of good 1 x1, so, this is expenditure on good 1 plus p2 into x2 this is the expenditure on good 2. These two expenditure is my total expenditure and these two should always be less than equal to my income, what is my income? My income is m. So, we get an equation and that is called a budget equation of this form - $p_1x_1 + p_2x_2 \leq m.$, should always be less than equal to m, okay, which is given in this form.

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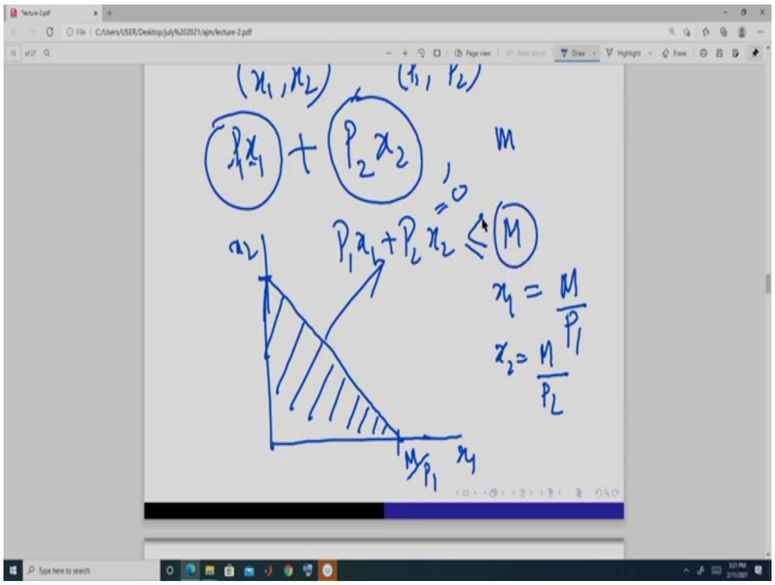

Now, how do we draw this budget line? So, from this if we spend everything on good 1, then this good 2 is 0. So, x1 is equal to m by p1. So, suppose this is m by p1 and if we spend everything on good 2, we will, how much we can buy, we can buy m by p2. And suppose this is and m by p2 then, this is our this $p_1x_1 + p_2x_2 \leq m$ equation and this whole set is the feasible set or all this bundle in this set, we can afford it, I can afford if my income is m, okay.

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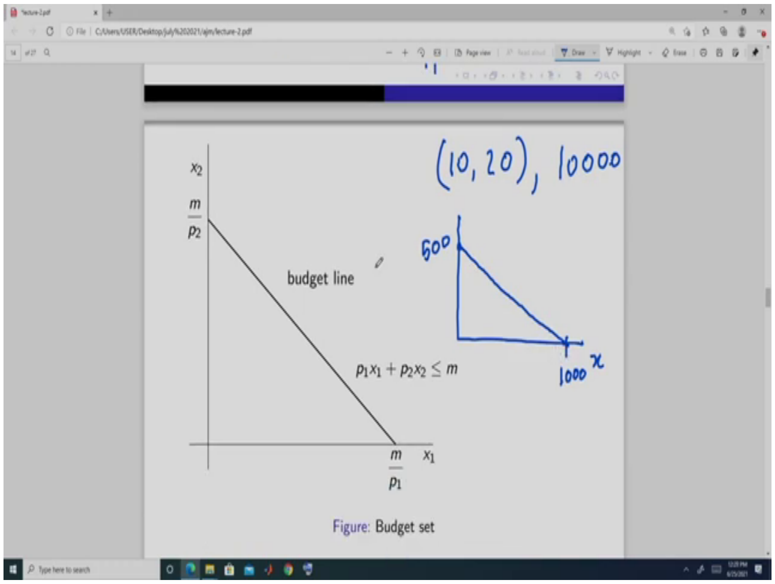

Let us take one example where price of good 1 is suppose 10 and price of good 2 is 20 and the income is suppose 10,000. So, if we try to look at the budget line, it will be like this. So, this point is m by p1. So, m is sorry this is 10,000. So, m is this. So, this is going to be 1000, this point is this divided by 20. So, it is going to be this divided by 20 which is going to be 500. Now, this, you joined it and we get the budget line. So, this is the budget line that we get, okay.

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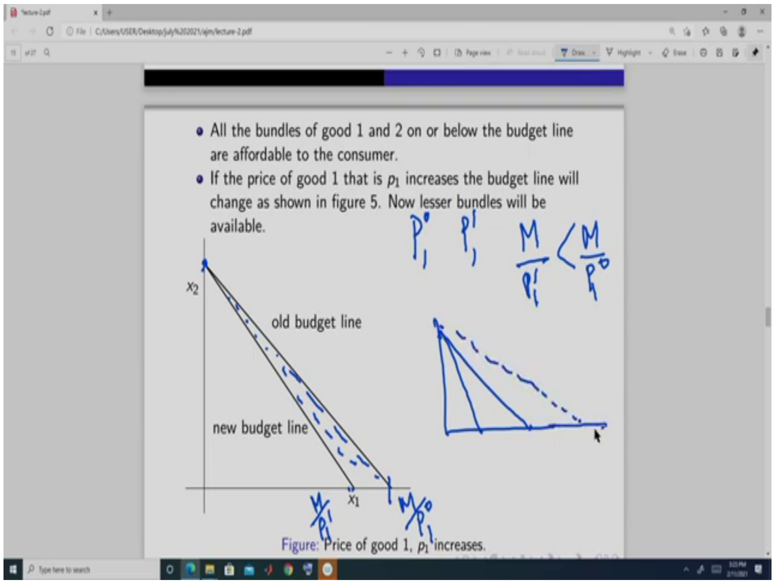

Now, suppose the price of good 1 increases from price of good 1 was p naught 1 now it increased to p11, right, then what is going to happen this term, this is going to be less $\frac{M}{P_1^1} < \frac{M}{P_1^0}$, right.So, if this point was m by p naught 1 and then this is, it will shift like this. So, these bundles are no more, I cannot afford this bundle when, right, but I can choose this bundle because if this bundle is I am only buying good 2 and zero units of good 1.

So, price of good 2 is fixed so, it is same. So, I can afford this bundle, but all these bundles which was earlier affordable it is those are not affordable anymore because price has increased. So, whenever price increases budget set contracts in this form. So, when price increases, budget line will contract in this way, and when the price decreases it will expand in this way, okay, for good 1.

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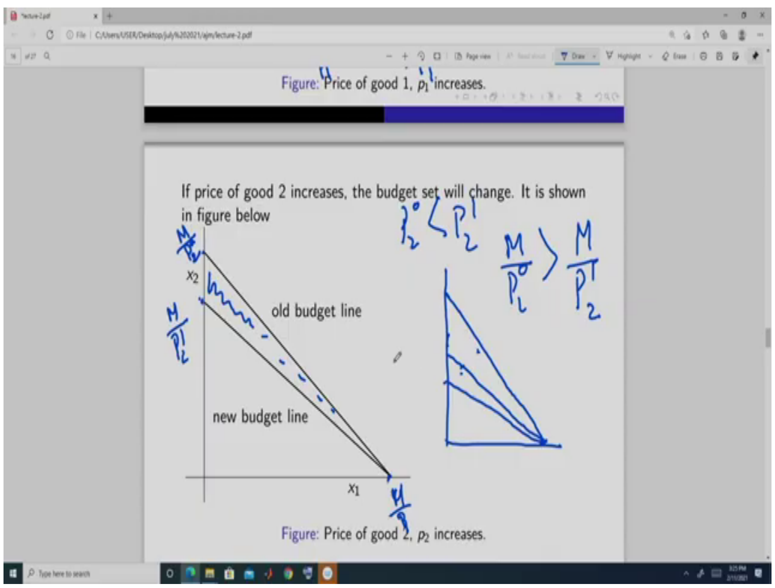

Similarly, if suppose the price of good 2 changes suppose the initial price of good 2 is p naught and it has increased to p naught, p21 or p12. So, it is like this- $P_2^0 < P_2^1$then this is going to be like this. So, we will move from this point to this, this was for p 2 naught and this is for p21 this. So, what are we going to get?

That these bundles are no more affordable, but this bundle which is m by p1, I can still buy this because price of good 1 is fixed, only I am changing price of good 2. So, when I change the price of good 2 keeping the price of good 1 fixed and if I increase the price of good 2, budget set moves like this. If I decrease the price of good 2, keeping price of good 1 fix it will, budget set will expand like this, okay**.** And so, this is how the budget set behaves, changes as we change the price of each good.

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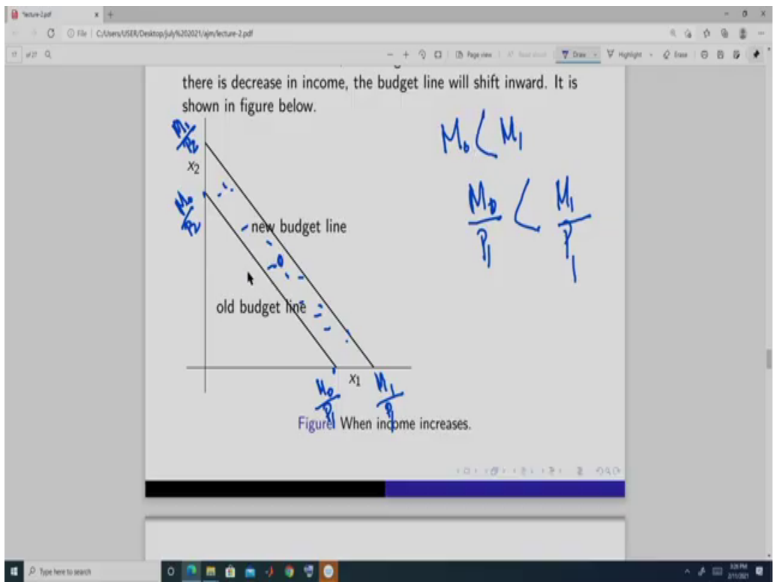

Now, suppose prices are fixed and income is changing. So, income has increased from suppose m naught to m1, then what happens? m naught by p1 this is going to be less- $\frac{M_0}{P_1} < \frac{M_1}{P_1}$. So, this which was m naught by p1 now, this is suppose m1 by p1 this is suppose m naught by p2 and this is m naught by p2 this is m1, right.

So, budget set expands as my income increases, now, more bundles are affordable to me, these bundles which was earlier not affordable now I can buy. So, more bundles are affordable to me. So, budget set expands. If suppose income decreases, suppose initial income is m1 and the new income is m naught, so this is less. So, this budget set will contract in this way, okay, it will move in this. So, this is how the budget set changes, when we change income and change prices.

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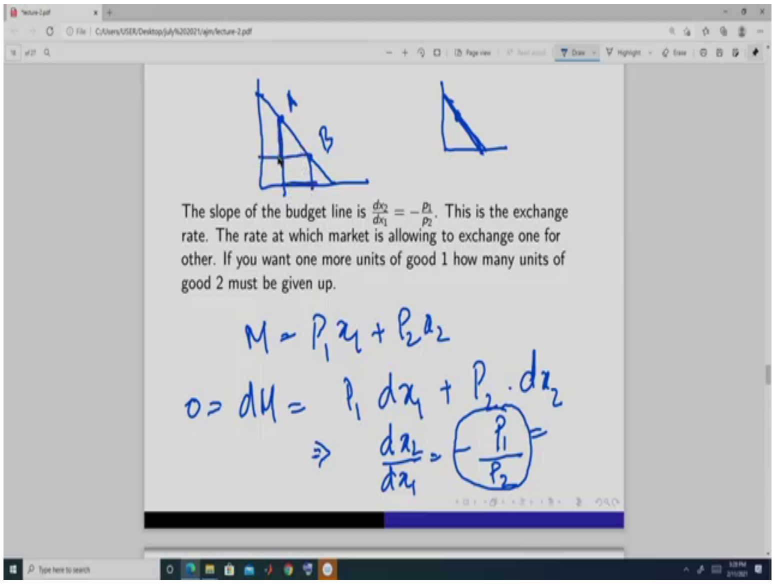

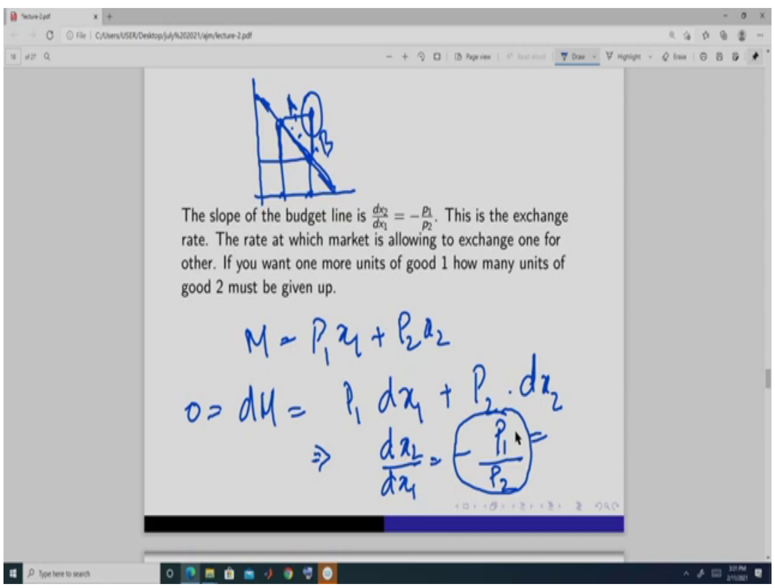

And from the budget set we will see so; our budget equation is this- $M = P_1X_1 + P_2X_2$, right. Now, if we take the total differentiation of this and what do we get? We get changes in m is equal to- $du_1 = P_1. dx_1 + P_2. dx_2$actually because price 1 and price 2 are taken as given by the consumer. So, this since income is not changing, so, if we move along our budget line like this, we get a slope this - $\frac{dx_2}{dx_1} =- \frac{P_1}{P_2}$, so this slope or budget line is giving me when we move from this to this point suppose from, okay, let us suppose move from point A to point B, if I have same amount of income, if I increase amount of good 1 from this one to this, I have to give up good 2 by this much amount.

So, the slope is giving me if I want to increase one unit of good 1 how much unit of good 2, I have to give up, so that I do not spend any extra amount or how much the market is allowing me to exchange. If I want to increase one unit of good 1, how much amount the market is allowing me to substitute the amount of good 2, that is how much amount of good 2 I have to give up, okay. So, this slope is also you can say is the exchange rate, okay.

And so, what we have done, we have defined the preferences that is how we choose the best bundle and we have got a utility function. So, we know that if we consume one bundle then how much utility we are going to get. Now, suppose we move from point A to point B, so, what does it mean that you increase the amount of good 1 from this unit to this unit. So, we increase the amount of good 1 from this much unit to this much unit.

Now, to since our income is fixed, so to remain the same budget set and so, that this bundle is affordable for us, when we give up this much amount like if we keep this and we keep increase the amount of good 2, then we get this bundle and this bundle is not affordable to me because it is outside the budget line. So, I have to give up good 1, good 2, how much I have to give up, this much amount.

So, this movement along the budget line is we can give it is defined by this slope which says that if I want to increase one unit of good 1 how much amount of good 2, I must give up, so that my expenditure remains same, okay. So, this you can say is a relative price of good 1 in terms of good 2 or you can say this is the exchange rate that is if you want to increase one unit of good 1 how much unit of good 2 you have to give up, okay.

So, now, we have done, how the budget set changes or how our sets which is defined or the bundles which are available to me or which are affordable to me how that changes when we change price of each good or when we change the income. And we also know how we choose from a given set of available bundle that is based on our utility. So, next we move to which bundle actually we choose.

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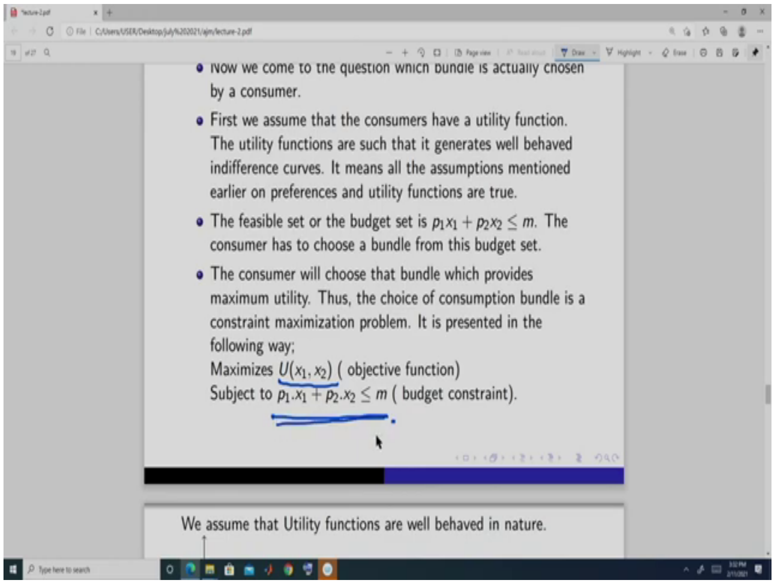

So, first here we assume that our utility function is we have a utility function. So, that means our top five assumptions are satisfied that is reflexivity, completeness, transitivity, monotonicity and continuity. Next, we further assume that our preferences are also convex. So, we get a well-defined utility function. So, the indifference curves are convex.

Next, we assume that we have a feasible or a budget set. So that is price of good 1 is p1 price of good 2 is p2 and the income is m and then we move to this problem that is we always want to maximize our utility function U(x1, x2) subject to this budget constraint- $p_1x_1 + p_2x_2 \leq m$. . What does this mean?

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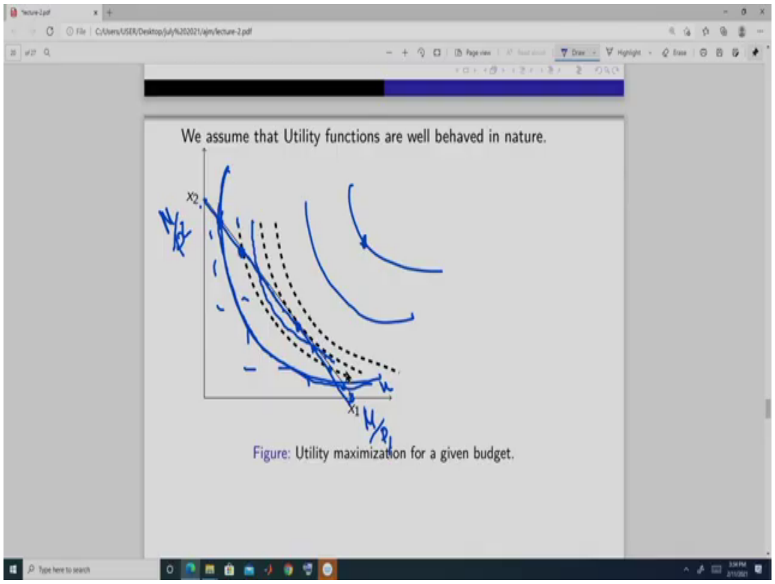

It means that we have a budget set like this, this all these points are feasible points, this point is m by p1, this point is m by p2 and we have indifference curve like this. Now, this point is not affordable to me. So, it I will not check how much utility I get from this, I will check only those bundles, which are in this set. And I will choose that one, which is giving me the maximum utility.

So, how do we arrived at that point, so suppose I choose this bundle, then I will get this much level of I am in this indifference curve. So, I will get this much utility some effect. Instead of this if I choose this one, then I will be at a higher indifference curve, right. So, that means I will get more utility. So, instead of this I should choose this bundle. So, in this way, I should move and I should, I will get this point.

Again, if I choose this, here, I get more utility than this, so, I should move in this. Again, in this a I get more utility in from this bundle than this because this indifference curve lies below these indifference curves and we know indifference curve cannot intersect because otherwise it will violate transitivity.

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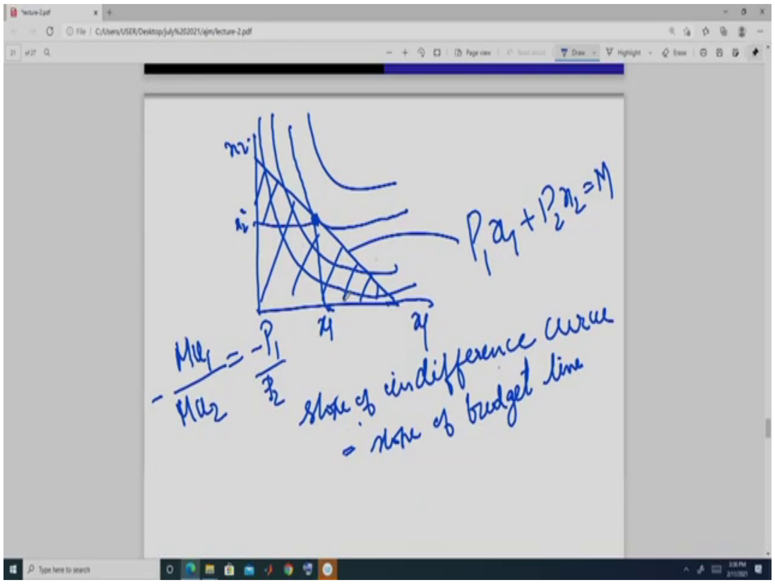

So, we get a situation like this, so this bundle, suppose this is a unique bundle(x_1^*, x_2^*) star is a bundle that maximizes my utility. So, utility subject to this budget set or budget constraint, okay. So, this is what? so, this means that when I my utility function is such that I get this sets of indifference curves and my budget bundle available bundle is given like this feasible set, this is $P_1x_1 + P_2x_2 = M$ this, then I choose this bundle, when I am maximizing my utility subject to this budget.

And at this point you will see one slope of indifference curve or you can say slope of indifference curve is actually is equal to slope of budget line or you can say this budget line is tangent to the indifference curve. So, at this point what do we get that marginal utility from good 1 and good 2. So, this which is slope of indifference curve should be equal to slope of budget line- $-\frac{Mu_1}{Mu_2} =-\frac{P_1}{P_2}$, okay.

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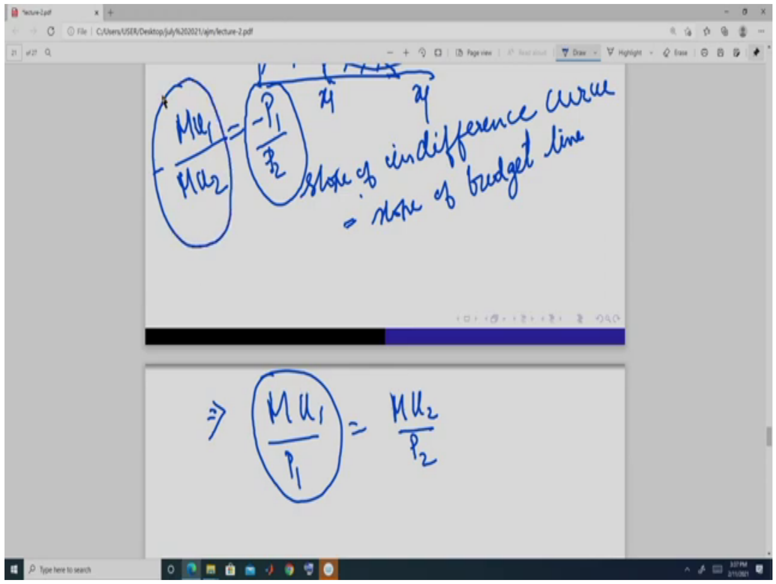

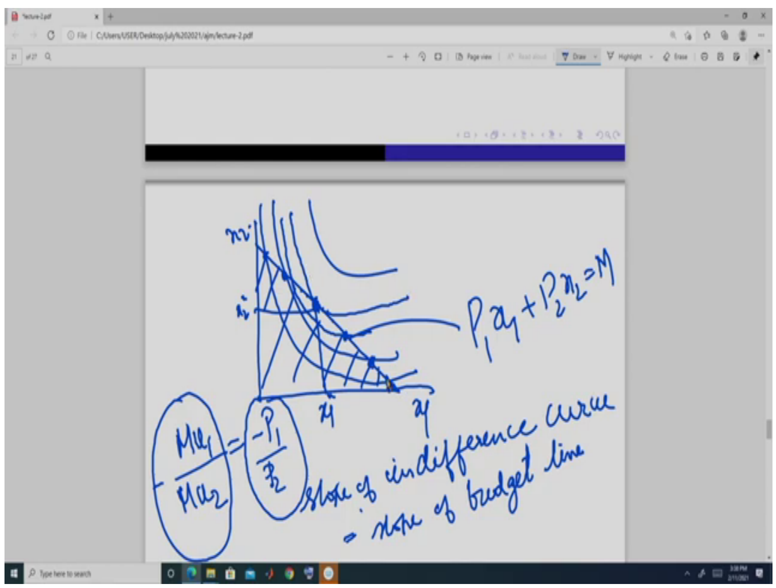

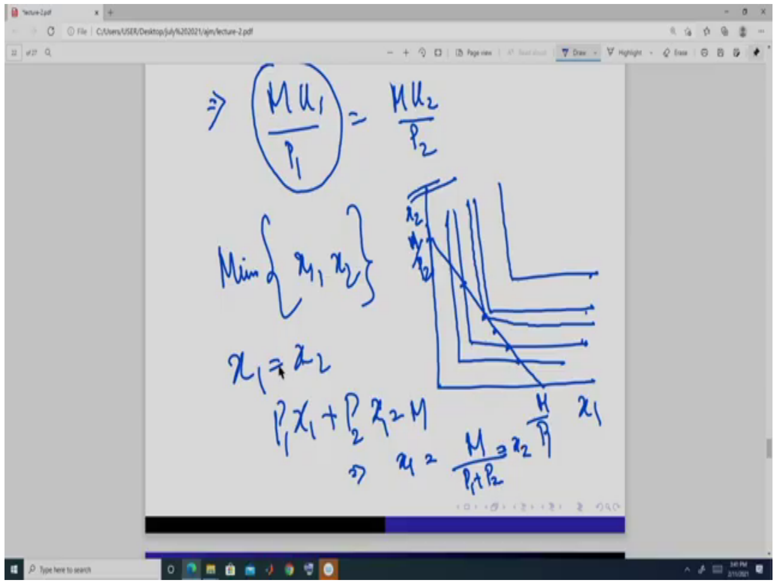

So, this actually gives us a interesting interpretation and this is like this- $\frac{Mu_1}{P_1} = \frac{Mu_2}{P_2}$. So, this means the amount of money that I, if I spent the one unit of money, the utility that I get from good 1 must be equal to the utility that I get from good 2 by spending that amount of money, right?. So, this means the exchange rate should be always equal to the marginal rate of substitution, that is how much I am willing to substitute good 2 for one unit of good 1 must be equal to what market is allowing me to exchange the amount of good 2 that I have to give give up to get one more unit of good 1, okay.

So, this should be and this point, we have understood why this is a maximum point because any point inside this curve is going to give us less utility. So, points should always be at this budget line, right. Now, if I choose this point, I get higher utility then here then this so, I will choose this so, I will move in this line and I will reach this point. Now, if I choose any point here, this point will give me higher utility than this, so, I will choose this rather than this.

This point will give me more utility than this and like this, I will hit this point where at this point the indifference curve is tangent to the budget line, okay. So, this is the optimal point or utility maximizing point. But, so, this is our tangency criteria. So, if we are given a utility function and if we are given a budget set, then we can find what is the optimal bundle or what is the utility maximizing bundle given that budget set by simply looking at the point at which the indifference curve is tangent to the budget line, right.

But can we do this for all things. Now, if utility function is suppose of this nature, min (x1, x2) like the case when the good 1 and good 2 are perfect complement. In this case this function is not differentiable and the indifference curves are of this nature, right and this utility is increasing, right. Now here how do we choose in this case. So, we will again draw the indifference budget line and this is m by suppose p1, here m by p2 and this bundle this side.

So, I will get a point like this and this point is going to give my utility maximizing point because if I choose any point here, this will is at a higher indifference curve. So, utility will be higher so, I will choose not, I will not choose this, instead I will choose this. In here I will choose this and not this one, so I like this. But here I will choose this and not this. Again, if we go further, it is not affordable. So, I will stop here.

So, this is my utility maximizing bundle in this case. And here we will, you can see how to solve this. So, in this kind of way, what do we do, we will equate these two x1 and x2 and see this will be equal and this bundle should be affordable. So, we will get x1, so this it should be in the budget set, so we get this. So, x1 is actually equal to M/P1+P2, like this and x2 is same from this, right. So, this is how we proceed in this.

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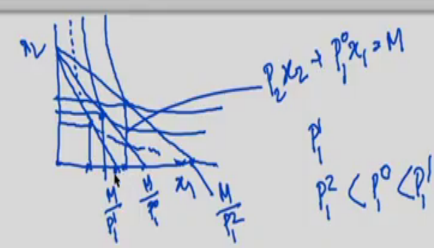
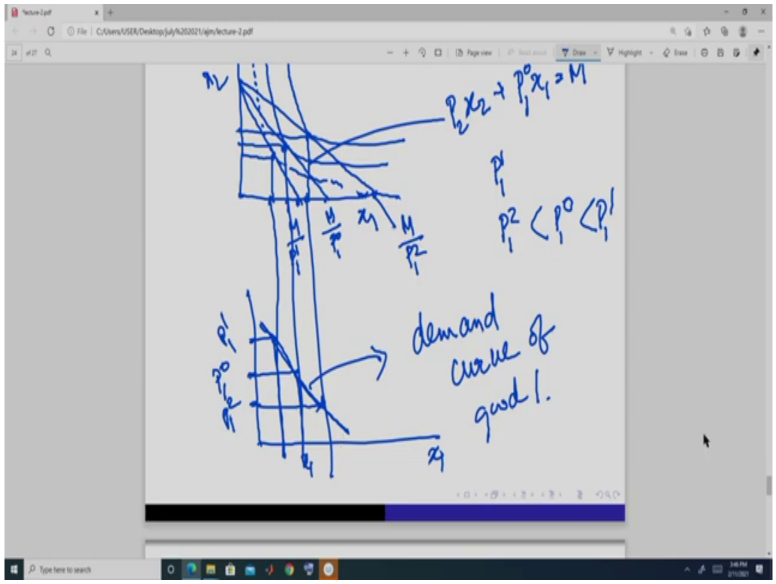
- At the point where utility is maximized subject to a budget constraint, we the following condition is satisfied; The slope of indifference curves= slope of budget constraint

$$-\frac{Mu_1}{Mu_2} = -\frac{\frac{\partial U(x_1,x_2)}{\partial x_1}}{\frac{\partial U(x_1,x_2)}{\partial x_2}} = -\frac{p_1}{p_2}$$

- Based on the maximization of utility subject to a budget constraint, we derive the demand curve for each good.





Now, we know, this is our tangency condition- $\frac{-Mu_1}{Mu_2} = -\frac{\frac{\delta U(x_1 x_2)}{\delta x_1}}{\frac{\delta U(x_1 x_2)}{\delta x_2}} = -\frac{p_1}{p_2}$ that we get when we are maximizing our utility. Now, we will see how to derive the demand curve of a function from this utility maximum. What do we do like this? How do we derive? Good 1 and good 2 and we want to derive the demand curve of good 1, okay.

Suppose this is our budget constraint- $P_2 x_2 + P_1^0 x_1 = M$, this is we have fixed price of good 2 at p2 and suppose price of good 1 is some p naught, income is fixed that is m. Now here our, this is our optimal bundle suppose, okay. Now, we increase the price of good 1 from p naught 1 to p11, okay. So, what is going to happen? Our budget line is going to shift like this.

So, earlier this was this- M/P_1^0, this point is now this- M/P_1^1, so, suppose this is our optimal bundle. So, now, all these bundles are not affordable. So, our new feasible set is this and, in this set, this is suppose our optimal bundle, right. So, mark this. Now, suppose we take a price P_1^2 which is less than P_1^0, P_1^1.

So, our budget line shifts something like this. So, this point is like this M/P_1^2 and here so, all these bundles are affordable and some more bundles are affordable given by this region because our price of good 1 has fallen. So, now, suppose this is the optimal point and this is the optimal demand of good 1. This is the optimal demand of good 1 when price is p naught. This is the optimal demand when price is p1, this is the optimal demand when price is p2.

So, in this, what do we do, we plot this point and we know p1 is greater than suppose this is p_1, p_0 is this and p2 is this. So, then we get this much demand of good 1 when the price is p11, we get this much demand of good 1 when the price is p1 naught and when price is p12 we get this much**,** right**,** and by joining these point, this is actually the demand curve of good 1, okay. And this demand curve is always downward sloping for a normal good, we will come to what is normal good later on not now.

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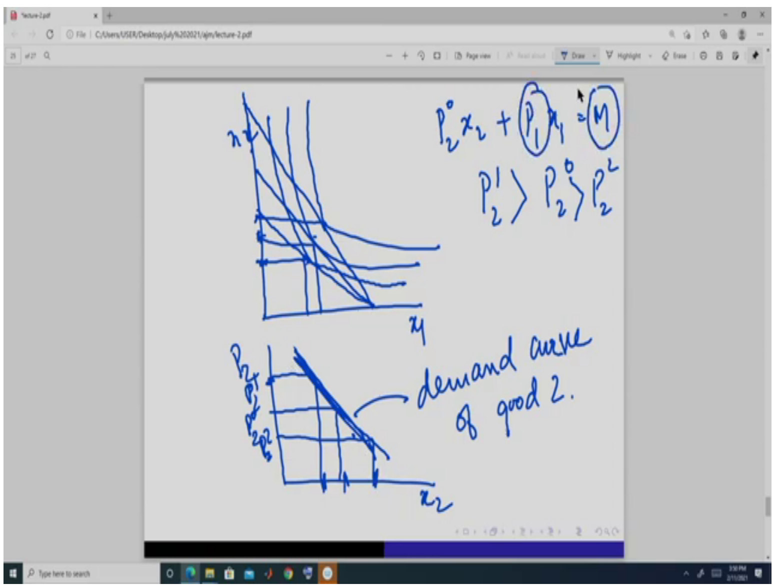

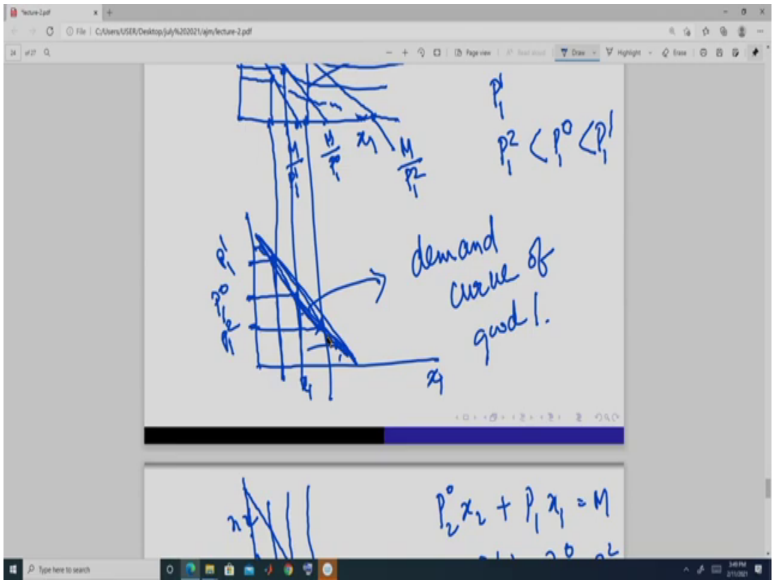

Let us do one more example and suppose we do it for good 2 now. So, this is good 1 and this is good 2. Suppose price of good 2 is p naught 2 and price of good 1 is fixed at p1 this- $P_2^0 x_2 + P_1 x_1 = M$. So, now price of good 2 is suppose increased and so what will happen? It will like this and suppose optimal bundle is here, okay. Now suppose it is so P_2^2 is suppose less than p naught 2 i.e $P_2^2 < P_2^0$. So, it is this by this, then optimal bundle is suppose this or these are the optimal bundles.

So, here in this axis we take p2, px2 and p2 this bundle is suppose this much, this bundle is suppose this much, and this bundle is for this much. This much when price is this much when price is P_2^1it is the greatest one, suppose this P_2^1. So, this next, P_2^0 , this is the bundle of good 2, this is P_2^0 . Now P_2^2 is this bundle highest, this bundle suppose. So, this is P_2^2 , so the demand curve for good 2 is this. This is the demand curve of good 2 and we get it in this way.

Now what do we see from here, so this individual is going to demand this much amount when price is P_1^1. This much amount when the price is P_1^0 , this much amount when price is P_1^2 of good 1. This much amount when price is something else, and this much amount like this so we get a curve function like this. We will derive this function algebraically also in the next class, okay.

So, and for good 2, similarly we get a demand curve like this and we see that it is downward sloping, that is when the price is high quantity demanded is low, when price is low quantity demanded is high. We have got this, when we have kept the income of this person this is fixed and the price of good 2 is fixed. We have got similar kind of demand for good 2 of this downward sloping demand curve of good 2 when price of good 1 is fixed and income is fixed, okay.

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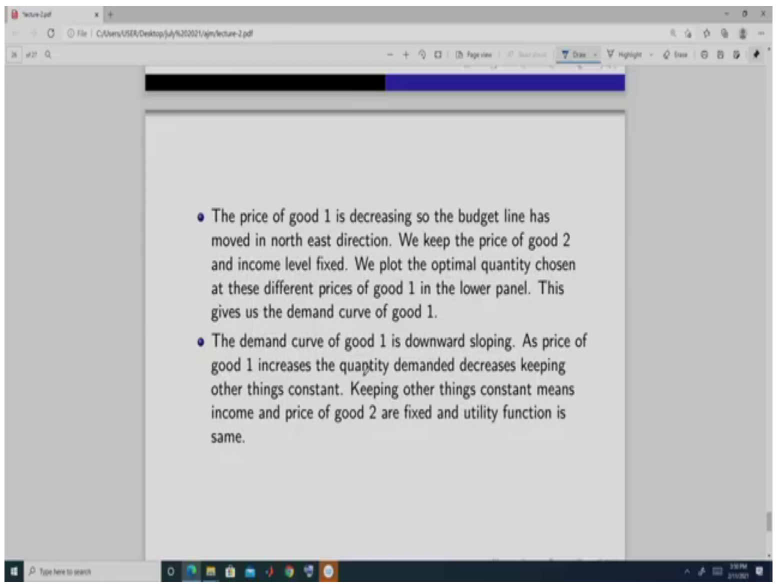

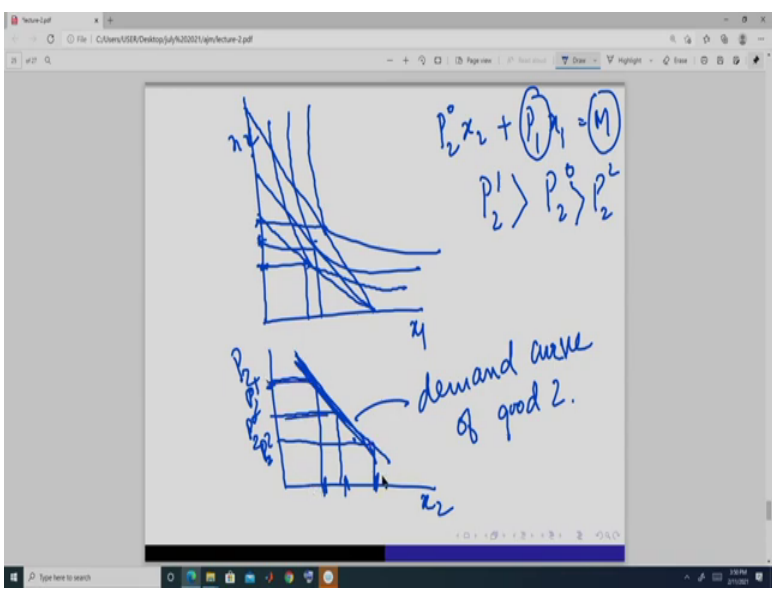

So, we have derived the demand curve. So, demand curve is actually is a function of prices and income. It says that as we change the price of a good, suppose as we change the price of good 1 how the quantity demanded of good 1 is going to change, okay. So, it is giving me this. So, at each price of good 1 how much quantity demanded when getting.

So, this is for one person and this information actually is giving me, is defining my demand curve. And what we will, do we will get the similar demand curve for all the individuals and then that will allow us to derive the market demand curve and that market demand curve is actually used by firm to determine how much amount of output to produce, okay.

So, in this way this consumer behaviour is playing an important role in the market. How the prices are going to be determined, okay. Because we get the demand curve from the preferences and the budget constraints, when the individuals are maximizing their utility subject to a budget constraints. So, I am stopping today at this level, at this point and next class we will solve this demand curve algebraically, okay. Thank you.