Optimization Methods for Civil Engineering
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Lecture - 06
Solution of Linear Problem using Excel Solver

Hello student, welcome back. So, in the last class we have solved several linear problems using simplex method, I hope now you are familiar with simplex method and you can handle a problem, a linear problem using simplex method.

So, today's class I will solve two new problems and initially I will formulate the problem, and then one problem I will solve using simplex method. And, another problem I will show you graphically and how you can find out the optimal solution of the problem. And, then I will solve these two Problems using Excel Solver.

So, I will basically show you how you can apply excel solver for solving a linear problem.

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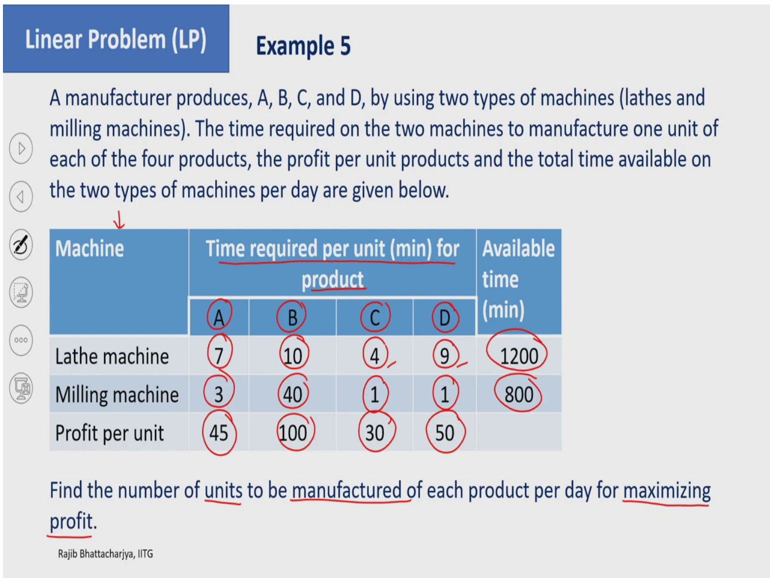

So, let us see the first problem. So, I can say it is example 5. So, we have solve up to example 4, in the last class, so this is example 5. The problem is a manufacturer produces A, B, C, D. So, these are some of the items by using two types of machines; one is lathe and another one is milling machine. The time required on the two machines to manufacture one unit of each of the four products, the profit per unit products and the total times available on the two types of machine per day are given below ok. So, this table has given the data.

So, there are four products as you know that A, B, C and D, if we produce this products on the lathe machine, then time required per unit that is in minute for the product is 7 minutes. That means, one product will take around 7 minute in the lathe machine and that is for product A, and product B it will be 10 minutes, then product C 4 minute, and product D 9 minutes.

So, if you are producing A, B, C, D on the lathe machine, then 7 minute will be taken by product A, then 10 minutes by product B, then 4 by product C and 9 minute by product D now the total available time. So, this much time I am getting actually the lathe machine is available for 1200 minute. The same product A, if we are using the milling machine, then time required is 3 minute for product A, then 40 minute for product B, then 1 minute for product C, and 1 minute for product D.

Now, what is the profit we can earn? The profit for product A is 45, then product B is 100, then product C is 30, and product D is 50. So, now what we have to do? We have to formulate an optimization model ok. Before that the time available in the milling machine is 800; that means, 800 minutes I can use this particular machine ok, milling machine I can use for 800 minutes.

Now, what is the question here? The question here is that I have to formulate an optimization problem and what we have to do? We have to maximize the profit ok. So, maximize the profit. So, we have to schedule our things in such a way, that we can obtain the maximum profit. So, now, let us formulate the problem first and then I will solve this problem using simplex method, and then I will show you how you can solve this problem using excel solver.

So, the question is the find the number of units to be manufactured for each product per day for maximizing profit. The question is that we have to maximize the profit. So, we have to do the scheduling and we have to find out so, that we can earn or we can we can achieve maximum profit.

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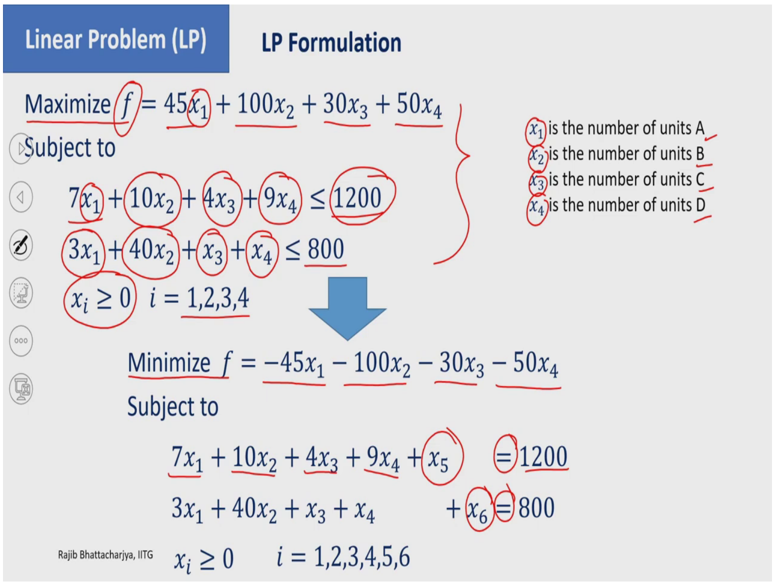

Now, let us take the variable. So, we have the x 1, so x 1 is the number of units of A ok. So, I would like to produce x 1 unit of A, then x 2 is the number of unit B, x 3 is C and x 4 is D. So, number of unit of D ok. Now, let us see what is the optimization model. So, here the objective function is maximization type, what is that I would like to maximize the benefit ok. Now, if I produce x 1 of A, then per unit benefit is 45 unit actually. So, it may be in rupees or it may be in some other unit so 45.

So, therefore, total benefit you are earning from the product A is 45 x 1, then product B is 100 x 2, then product C is 30 x 3 and product D is 50 x 4 ok. So, this is the benefit we are earning. So, therefore, the objective function is maximize this benefit. Now, what are the constraints? So, the lathe machine is available for 1200 minute. So, therefore, if I produce x 1 of A then how much minutes I need? I need 7 minutes ok.

So, therefore, the 7 into x 1 is the total time required in the lathe machine for producing x unit of A. Similarly, the total time required for B in the lathe machine is 10 x 2, then for C 4 x 3 and for D that is 9 x 4 ok.

And summation of all these things should be less than 1200. So, that is the available time; that means, I cannot use the lathe machine more than 1200 minute. Similarly, if I use the milling machine, then total time required for product A is thrice x 1, then product B is 40 x 2, product C is x 3, 1 into x 3 and product D 1 into x 4 and the total time should be less than 800 minutes ok.

So, I have total 800 minutes and this x i should be greater than equal to 0, so, i equal to 1 to 4 ok. So, now, all together this is an linear problem. So, I have formulated the linear problem. So, objective function is maximization type function, because I would like to maximize the profit and I am putting the constraint, what is constraint? The time availability on the lathe machine as, well as milling machine.

Now, what is the next step? So, I think already you have solved several problems. So, the what you have to do basically, we have to convert this problem to standard form. So, the first one is that I would like to convert it to minimization type. So, how I am converting? So, I am multiplying the objective function by minus 1. So, therefore, I am getting minus 45 x 1, minus 100 x 2, minus 30 x 3, and minus 50 x 4. And, the constraints, so, constraints are that is 7 x 1 plus 10 x 2 plus 4 x 3 plus 9 x 4. Now, I am putting a slack variable here, this is x 5 just to make it equal and this is equal to 1200.

And, similarly on the second constraint, so, I am putting another slack variable that is x 6 which is equal to now 800 so, just to make it 800. So, now, with this standard form now I have x 5 and x 6 ok.

So, I can get the initial basic feasible solution, if I put x 1 to x 4 0 if I say that these are non basic variable, and x 5 and x 6 are basic variables. And, in that case so, I can obtain an initial basic feasible solution, which is x 5 equal to 1200 and x 6 equal to 800 and x 1, x 2, x 3, x 4 are 0. So, they are non basic variable.

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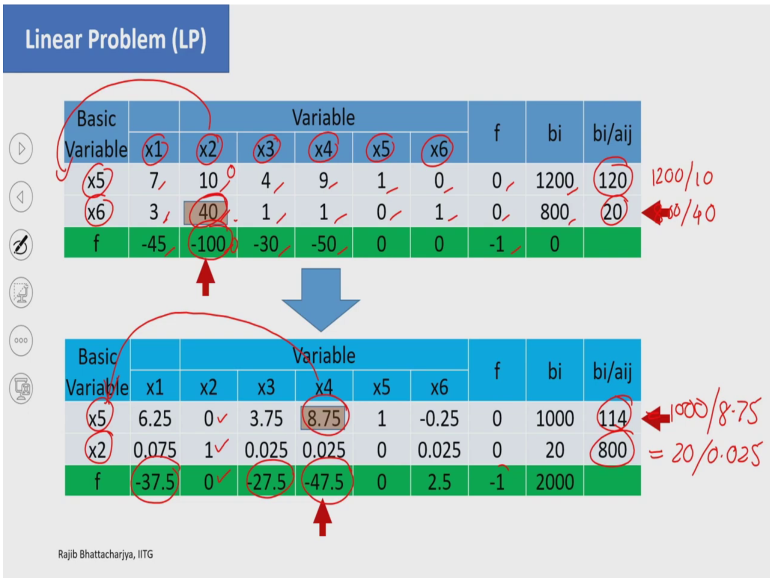

So, let us put at the simplex table. So, we have this is x 1, x 2, x 3, x 4, x 5, and x 6. So, I am putting that constraint. So, this is 7 coefficient of x 1 in the first constraint is 7, then x 2 that is 10, 4, 9, 1 and this is 0 and this is 0 and which is equal to 1200. And, the coefficient of x 1 in the second constraint, that is 3 for x 240, then 1, 1, 0, 1, 0 and finally, it is 800. And, I am putting the objective function and this is minus 45 coefficient of x 1 is minus 45 minus 100 minus 30 minus 50, then this is minus 1 and 0 ok.

Now, x 5 and x 6 so, x 5 and x 6 are now basic variables ok. So, they are basic variable x 5 and x 6 and x 1, x 2, x 3 and x 4 are non basic variable. Now, what is the first step? That I have to look at the objective function row and I have to look for the minimum value here minimum negative. So, what is minimum negative here? That is 100, so that is the minimum one. So, therefore, the x 2 will enter into the basis. Now, question is that which will come out of the basis, whether x 5 or x 6? So, I have to look at the b by a i j ratio and this is 120 ok, that is 1200, that 1200 divided by 10.

So, I am getting 120 and this is 800 divided by 40. So, I am getting 20 ok. So, what I have to do here I have to take the minimum 1; that means 20. So, therefore, this is my pivoting element. So, what I will do? I will make this one and for others I will make it 0 and 0 something like that ok.

So, if I do that, if I do the row operation. So, finally, I am getting this is 0, this is 1, and this is 0. And, now I have to look at, so, you just see now x 2 is entering into the basis so, x 2 is now basic variable and x 5 is also basic variable and other variable that is x 1, x 3, x 4, and x 6 is now non basic variable.

So, what is the solution now here? So, I can say that x 5 equal to 1000, x 2 equal to 20 and the objective function value is minus 2000. Now, what we have to check? Now, we have to check is there any negative coefficient on the objective function row yes.

So, we have actually so, this is minus 37.5, this is minus 27.5, this is minus 47.5; that means, I can still reduce the objective function value and, what I have to do? I have to take the minimum one. So, minimum one here is that 40 minus 47.5. So, therefore, x 4 will come into the basis, now whether x 4 will replace x 5 or x 2?

So, let us look at the ratio here. The ratio here is that is 1000 ok, divided by 8.75. So, I am getting 114 and the second one is this is 20 divided by 0.025 ok. So, I am getting 800. So, what I have to do? I have to take the minimum one. So, here minimum one is 114. So, therefore, this will be my pivoting element. So, I will make it 1 and for others I will make it 0.

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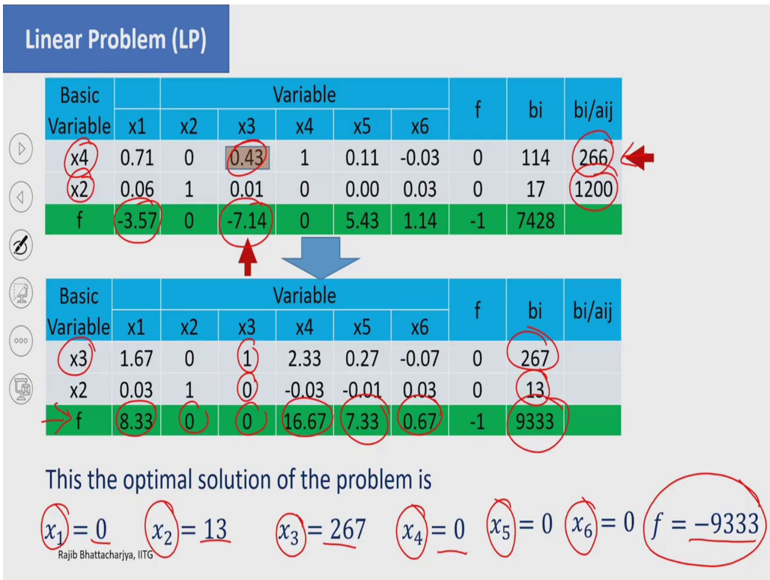

So, after that, so, I am getting this table. So, now, x 4 is entering into the basis and x 2 is already there. Now is there any negative coefficient on the objective function row yes. So, we have minus 3.57 and this is minus 7.14.

So, what I have to do; that means, we can still reduce the objective function value. So, therefore, I will consider the minimum negative. So, here it is minus 7.14. Let me calculate the b by aij ratio this is 266 and this is 1200 ok. So, therefore, this is the minimum one. So, what you have to do this will be the pivoting element ok. So, then let us go to the next table.

So, in next table so, this is 1 and this is 0 and x 3 is entering into the basis, so, x 3 is now basic variable and x 4 is non basic variable. So, in this table that if you look at the objective function row and there is no negative coefficient ok. All are positive, this is positive, this is positive, this is positive, this is positive, this is positive ok and this is also positive.

So, therefore, it is not possible to decrease or to reduce the objective function value so; that means, we got the optimal solution. So, what is the solution now? That, x 1 as a non basic variable so, that is 0 x 2 is a basic variable, so which is equal to 13 ok, this is 13. Then x 3 is also a basic variable, which is equal to 267, x 4 is a non basic variable 0, x 5 is non basic variable 0, x 6 is non basic variable 0 and what is the objective function value? Objective function value is minus 9333; that means 9333. So, that is the objective function value ok.

So, the maximum benefit I can achieve is 9333 and what I have to do, that x 1 is 0 basically. So, I will not produce the A, product A, I will produce only product B that is x 2, how many unit I will only produce product B of 13 units and product C of 267 units and product D is 0.

So, what I will produce product A, there is no product A, product B 13 unit, product C 267 unit, and product D 0 and maximum benefit I can achieve is 9333. So, we got the solution of this problem. So, I will also show you how you can solve this problem using excel solver. So, before that let us discuss the next problem.

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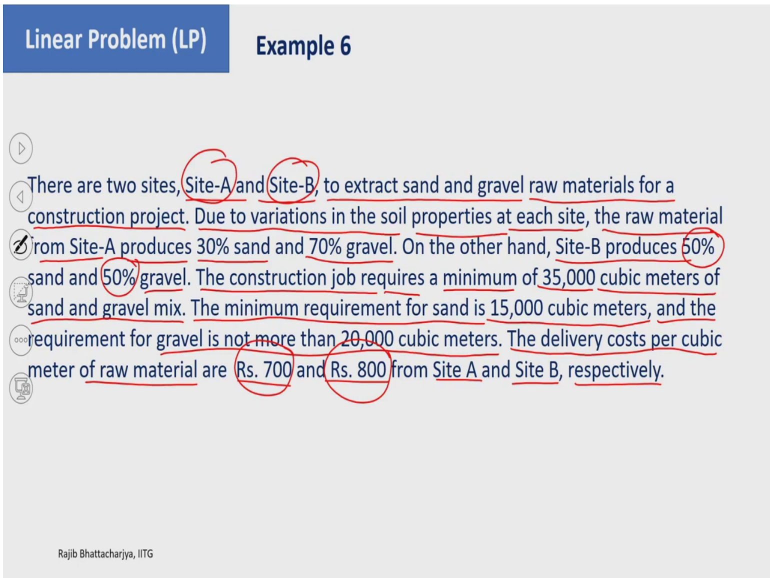

The next problem is problem 6, the problem is there are two sites; Site-A and Site-B, to extract sand and gravel raw materials for a construction project. So, what we can do, there are two sites. So, from Site-A and Site-B, so, we can extract sand and gravel. So, sand and gravel that is required for a construction project ok. So, I can take either from Site-A or from Site-B or from both Site A and Site B.

Now, due to variation in soil properties at each site the raw materials from Site-A produces 30 percent of sand and 70 percent gravel ok. So, if I take the raw material from Site–A, that raw material contain 30 percent of sand and 70 percent of gravel. On the other hand if I take the raw material from Site-B. So, that produces 50 percent of sand and 50 percent of gravel ok.

So, 50 percent sand I can get or 50 percent gravel I will get, if I take the raw material from Site-B. That construction job or construction project requires a minimum of 35,000 cubic meter of sand and gravel mix. So, that is the requirement. So, sand and gravel mix requirement is the minimum 35,000 cubic meter ok. The minimum requirement of sand is 15,000 cubic meter ok. So, sand requirement is 15,000 cubic meter and the requirement of gravel is not more than 20,000 cubic meter.

So, gravel requirement is less than 20,000 cubic meter, but sand requirement is more than 15,000 cubic meter. So; that means, minimum requirement is 15,000 and, but for gravel the maximum requirement is 20,000. The delivery cost per cubic meter of raw material are rupees 700 and rupees 800 from Site-A and Site-B respectively; that means, if I take one cubic meter of raw material from Site-A, the delivery cost is 700 and if I take it from Site-B the delivery cost is 800 ok.

So, now, we have to take a decision that, how much raw material you are taking from Site-A and how much raw material you should take from Site-B in order to minimize the cost ok. So, here what is your objective that objective is to minimize the delivery cost ok. So, that is my objective and now I have to take a decision that, how much material you are taking from Site-A and how much material you are taking from Site-B ok.

So, we have to formulate the problem and after that, I will show you graphically how you can find out the solution of this problem and later on I will solve this problem using excel solver.

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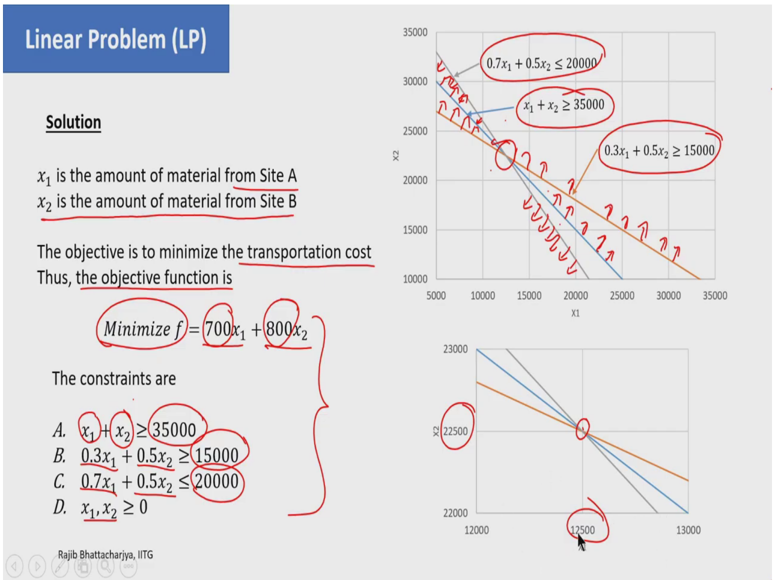

So, let us formulate the problem. So, here x 1 is the amount of material from Site A; that means, x 1 is the amount of material that raw material I am taking from Site A, x 2 is the amount of material that raw material I am taking from Site B. Now, what is the objective? Objective is to minimize the delivery cost or we can say transportation cost ok.

So, therefore, the objective function is a minimization type; that means, I would like to minimize the delivery cost ok. So, what is the delivery cost per cubic meter? That is 700 for Site A. So, therefore, the total delivery cost will be 700 into x 1 and from Site B that is 800. So, delivery cost for Site B is 800 x 2 ok. And, I would like to minimize this particular objective function, because I would like to minimize the delivery cost. The first constraint is that the sand and gravel mix should be more than 35,000 cubic meter.

So, therefore, x 1 plus x 2 ok, that is the gravel and sand mix. So, x 1 plus x 2 should be greater than 35,000 cubic meter ok. So, that is one constraint that, the total gravel and sand mixer should be more than 35,000 cubic meter. Now, the total amount of sand should be more than 15,000; that means, the minimum requirement of sand is 15,000 cubic meter.

So, if I take sand, if I take the raw material from Site A then how much sand I am getting the 0.3 x 1. And, if I take raw material from Site B, then how much sand I am getting 0.5 x 2. So, therefore, 0.3 x 1 plus 0.5 x 2 should be greater than equal to 15,000 that is the minimum requirement of sand. Similarly, the maximum requirement of gravel is 20,000 cubic meter. So, if I take the raw material from Site A. So, how much gravel I am getting 0.7, x 1. And, similarly if I take the raw material from Site B how much gravel I am getting 0.5, x 2.

So, therefore, 0.7 x 1 plus 0.5 x 2 should be less than equal to 20,000 and x 1 and x 2 should be greater than equal to 0. So, these are the constraints so, I am getting this particular linear problem. So, here objective function is a minimization type function I would like to minimize the cost and I am getting all 4 constraint, that is x 1 plus x 2 greater than 35,000 greater than equal to 35,000, then 0.3 x 1 plus 0.5 x 2 greater than equal to 15,000 and 0.7 x 1 plus 0.5 x 2 less than equal to 20,000.

So, let us plot it ok. So, if I plot it the blue line is basically that x 1 plus x 2 equal to 35,000 the blue line. So, therefore, it should be greater than, greater than means that the value should be on this particular side ok. So, I can say this is the value should be on this side. This is the constraint the second constraint, that is 0.3 x 1 plus 0.5 x 2 equal to 15,000 and this is also greater than type.

So, therefore, this is your feasible side ok. So, this is your feasible side the solution should be on this side ok. And, the third one is your this one that is the third constraint, the third constraint is 0.7 x 1 plus 0.5 x 2 less than 20,000. So, therefore, this is the feasible directions ok, feasible side; that means, solution should be on this side.

So, you just see that whatever solution I am I should get, that solution should satisfy all these 3 constraint. So, in this case if I see the solution is somewhere here, because if I take any solution here, this will be an infeasible solution any solution on the other side, this will be an infeasible here also it is infeasible all solution are only this solution is a feasible solution and which will satisfy all these constraint ok.

So, if I look at the close view of this particular point. So, you can see that this is the point where all these three constraint or you can say four constraint, that is with non negativity constraint. So, this is the point where it will satisfy. So, therefore, the solution is that x 1 will be 12,500 and x 2 will be 22,500 ok. So, 500 cubic meter; that means, from Site A if I take 12,500 cubic meter and Site B if I take 22500 cubic meter and then whatever cost I will get and that will be the minimum cost and that will also satisfy all these constraints.

So, therefore, so, this is the solution of this particular problem. Now, let us see how we can solve this problem using excel solver?

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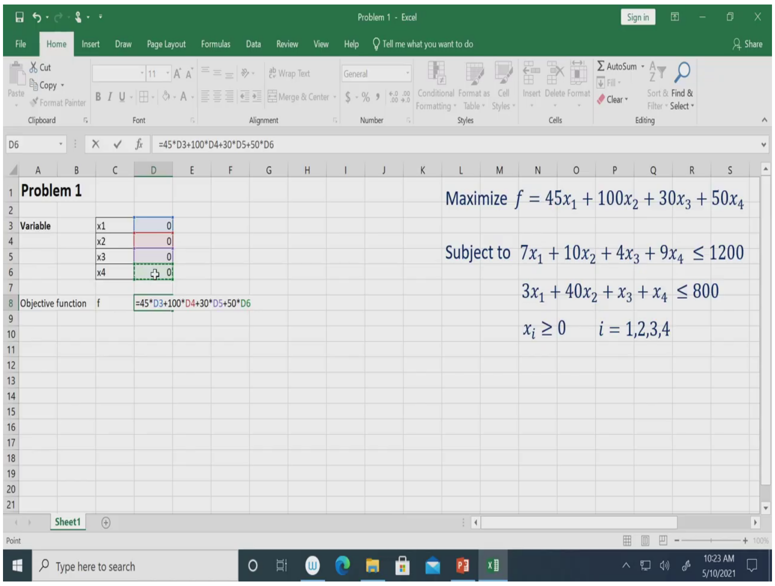

So, let us solve the Problem 1. So, that is a maximization type problem. So, the objective function is f equal to 45 x 1, plus 100 x 2 plus 30 x 3, plus 50 x 4 and we have two constraints ok to start the problem. So, let us define the variable first. So, we have 4 variables here, that is x 1, x 2, x 3 and x 4 and I am putting some initial value in this cell. So, that is 0 0 0 0 all are 0. So, I have defined the variables here ok. Now, let us define the objective function ok.

So, objective function is f, now I have to write this equation this objective function equation and objective function is 45 x 1 plus 100 x 2 plus 30 x 3 plus 50 x 4. How I will write, that is 45 star x 1. So, this is the x 1 value ok, plus 100 star x 2, plus 30 star x 3, plus 50 star x 4. So, I have written the objective function here.

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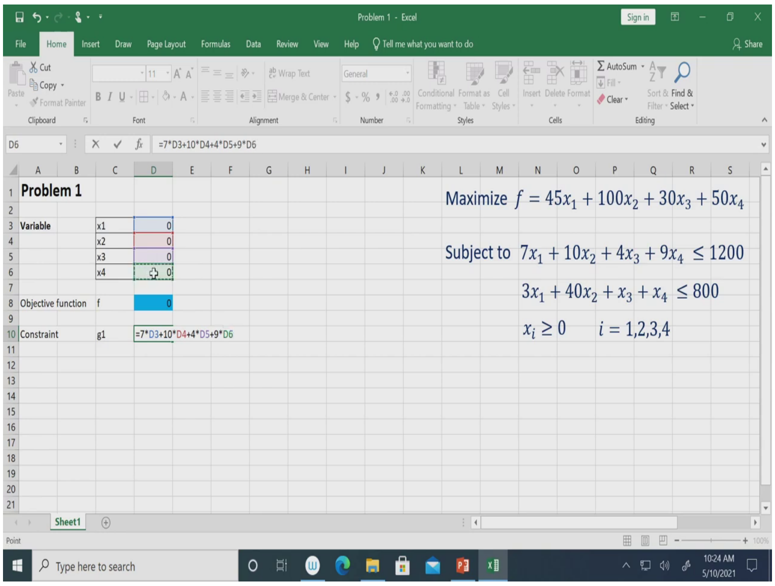

So, this cell is giving the objective function. So, I am just putting some color here maybe so, this is my objective function. Now, I have to define the constraints. So, we have two constraints here that is g 1 and g 1 equal to that is 7 star x 1 plus 10 star x 2 plus 4 star x 3 plus 9 star x 4 ok.

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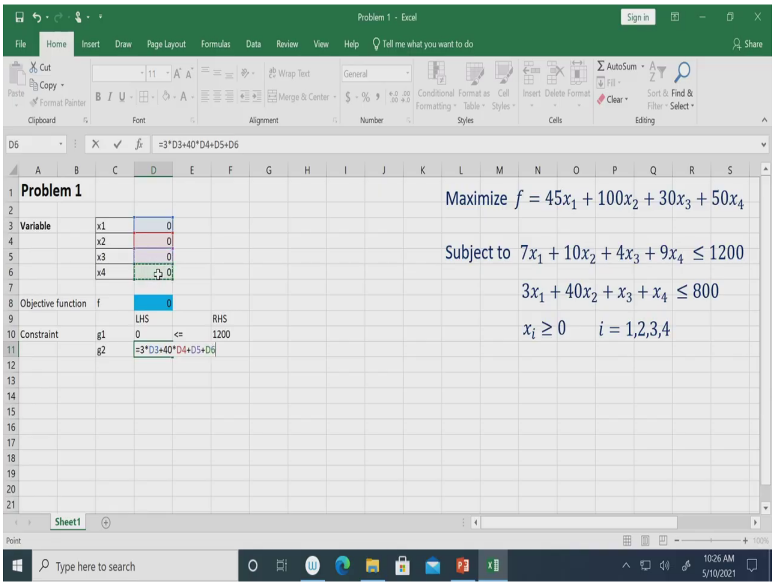

So, I have defined here, that is 7 x 1 plus 10 x 2 plus 4 x 3 plus 9 x 4 and I can define here, this is a less than equality type constraint and this must be less than equal to 1200 ok. So, this is my g 1. So, I can say this is right hand side and this is left hand side left hand side ok. So, there is another constraint that is g 2. So, I am writing the left hand side, so, left hand side equal to 3 star x 1 plus 40 star x 2 plus x 3 plus x 4.

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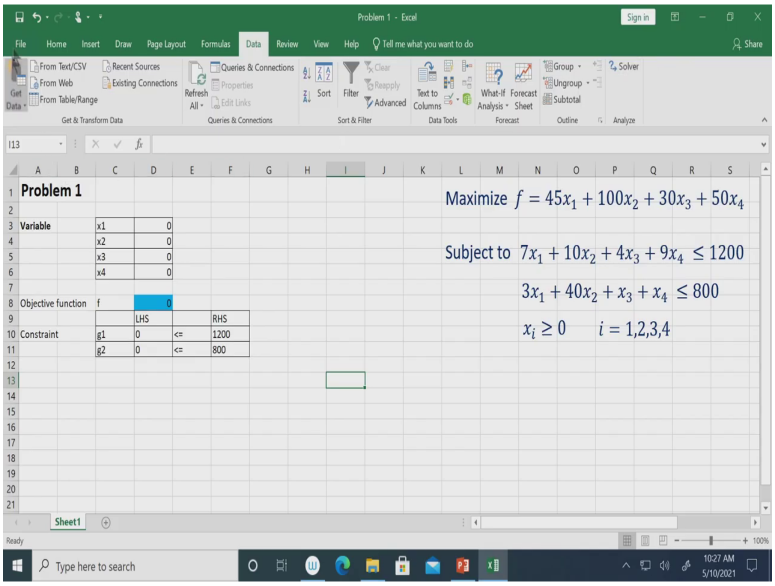

And, this is also less than equality type and this is equal to 800. So, now I have defined my constraints here, now let us solve the problem. So, for solving the problem I have to use the excel solver. So, excel solver is your in data. So, you can see that solver should be somewhere here and if it is not there.

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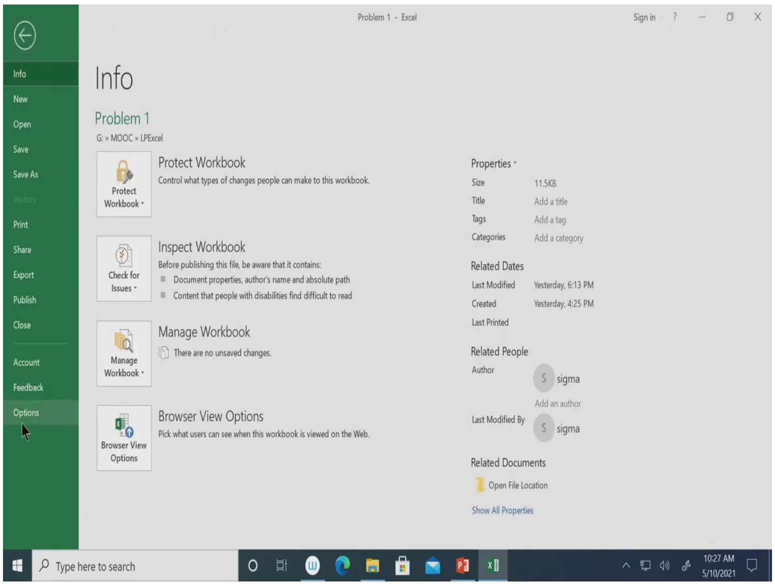

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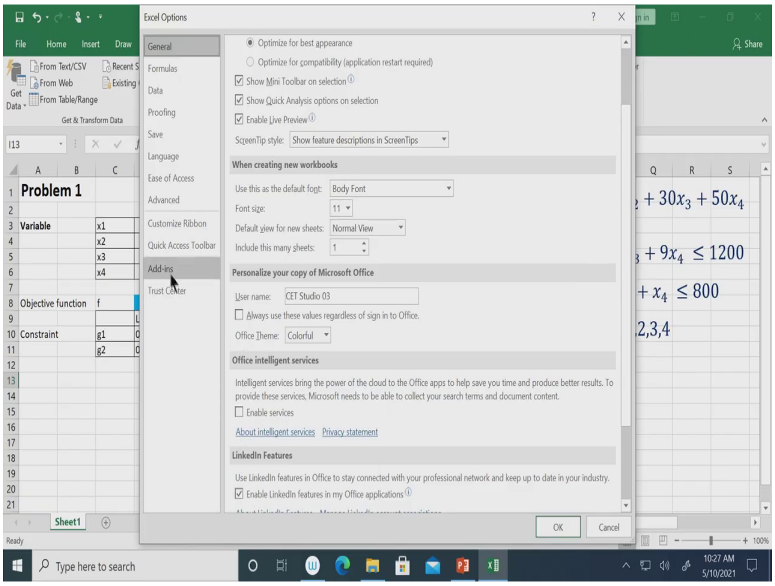

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Advanced
Customize Ribbon
Quick Access Toolbar
Add-ins
Trust Center
Optimize for best appearance
Optimize for compatibility (application restart required)
Show Mini Toolbar on selection
Show Quick Analysis options on selection
Enable Live Preview
ScreenTip style: Show feature descriptions in ScreenTips
When creating new workbooks
Use this as the default font: Body Font
Font size: 11
Default view for new sheets: Normal View
Include this many sheets: 1
Personalize your copy of Microsoft Office
User name: CET Studio 03
Always use these values regardless of sign in to Office.
Office Theme: Colorful
Office intelligent services
Intelligent services bring the power of the cloud to the Office apps to help save you time and produce better results. To provide these services, Microsoft needs to be able to collect your search terms and document content.
Enable services
About intelligent services
Privacy statement
LinkedIn Features
Use LinkedIn features in Office to stay connected with your professional network and keep up to date in your industry.
Enable LinkedIn features in my Office applications
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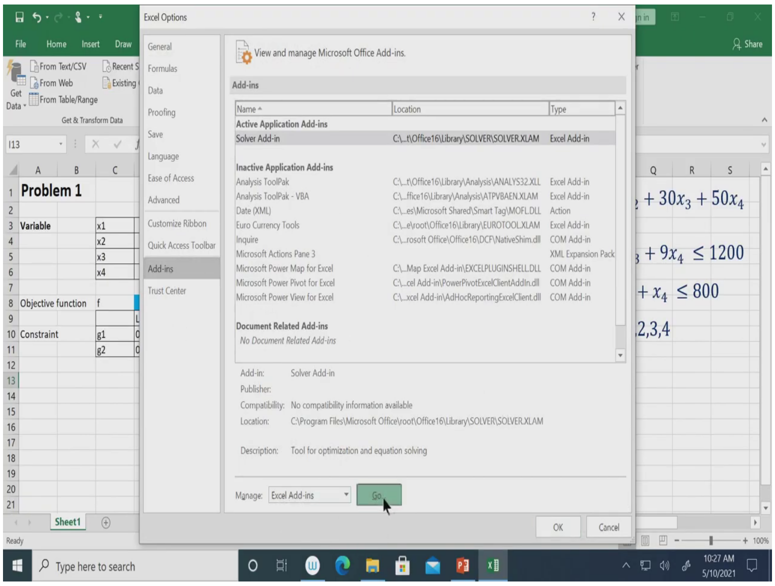

So, you go to file then go to option and go to Add-ins. So, this is excel Add-ins you should get, and after that you just check Solver Add-ins and make it ok.

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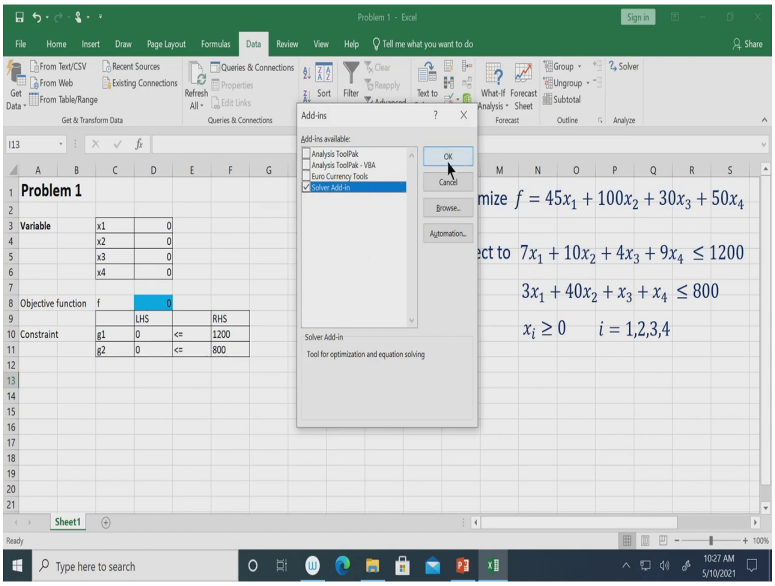

So, then this Solver will appear here. So, in my case already I have installed that one, so I will not install it again. So, the Solver is here, so let us use this Solver, so, you go to Solver.

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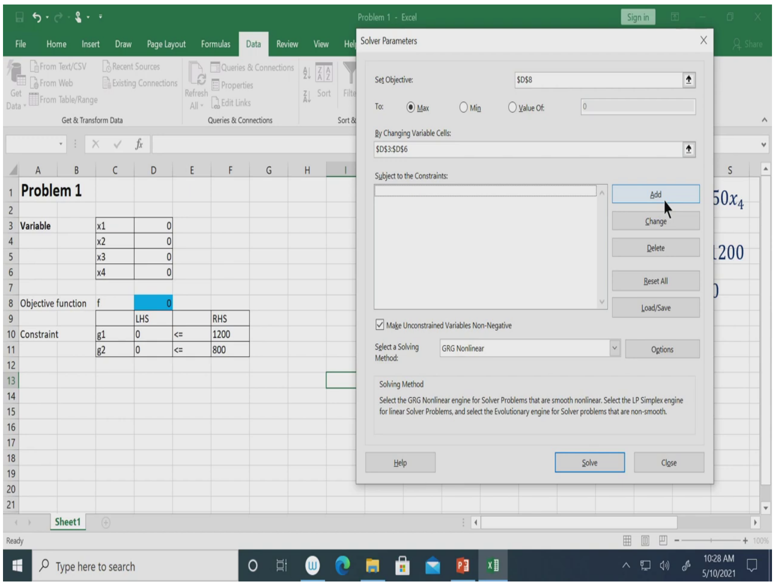

Now, here I have to define the problem. The first is the Objective function. So, objective function cell is here. So, this cell that is D 8 is the objective function cell. Now, my problem is the maximization type. So, therefore, here I can define either, maximization, minimization or value of ok, but in my case this is a maximization problem. So, already maximization is checked. So, I use maximization.

Then, by sensing the variable cell so, these are my variable cells. So, I have to define that is D 3 to D 6 ok, D 3 to D 6. So, I have defined my variable cell here and then I have to add the constraints.

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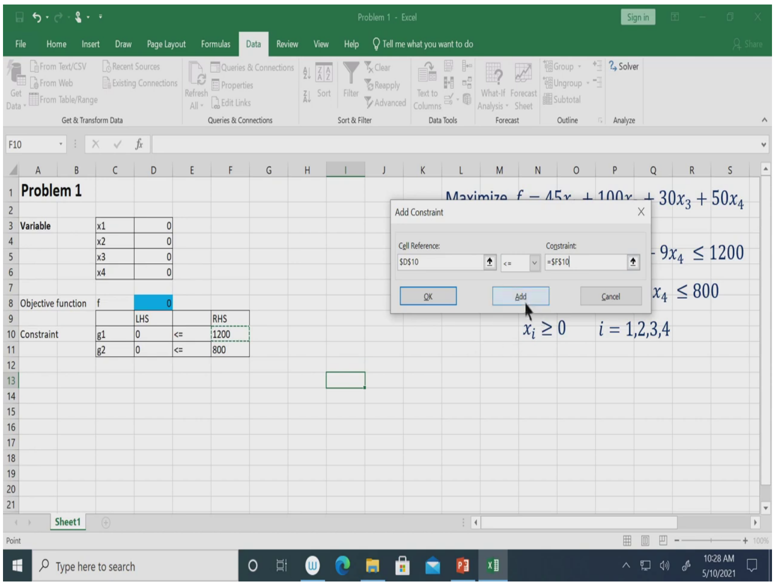

So, constraint is that this is the first constraint left hand side of the first constraint and this is less than equal to and this is the right hand side of the constraint. So, now, I am adding it ok.

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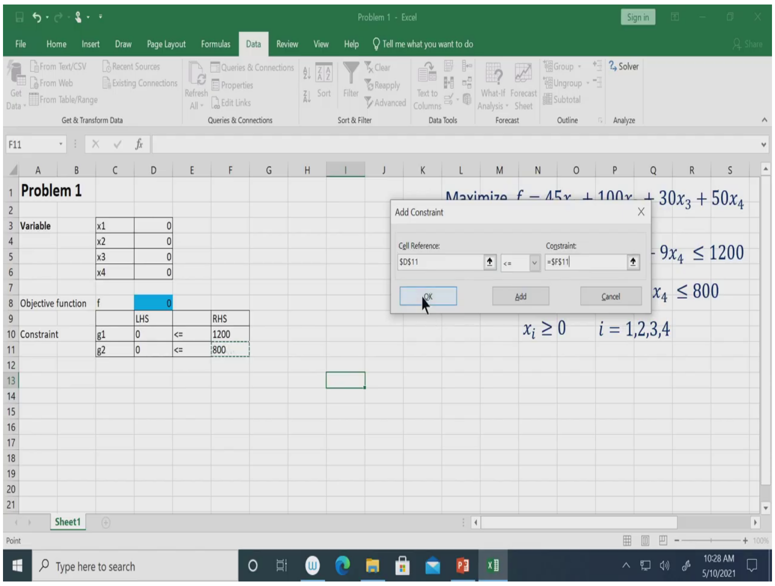

The second one is this is the left hand side of the constraint and this is the less than equality type constraint and right hand side is 800 ok.

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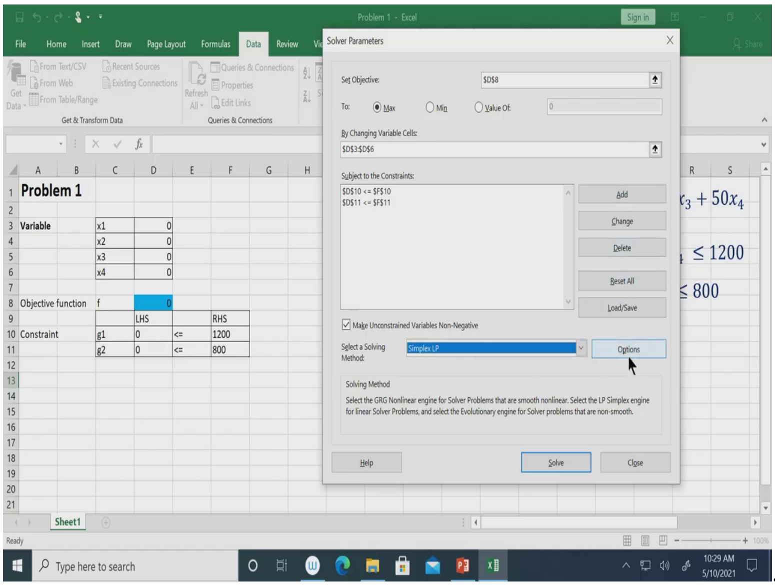

So, I am defining this constraint. So, I have defined these two constraints here and then I will use so, I have to select the setting here. So, I will use the simplex LP model ok. So, now, my decision variables are non negative. So, therefore, I have to check this particular box and now I have defined everything.

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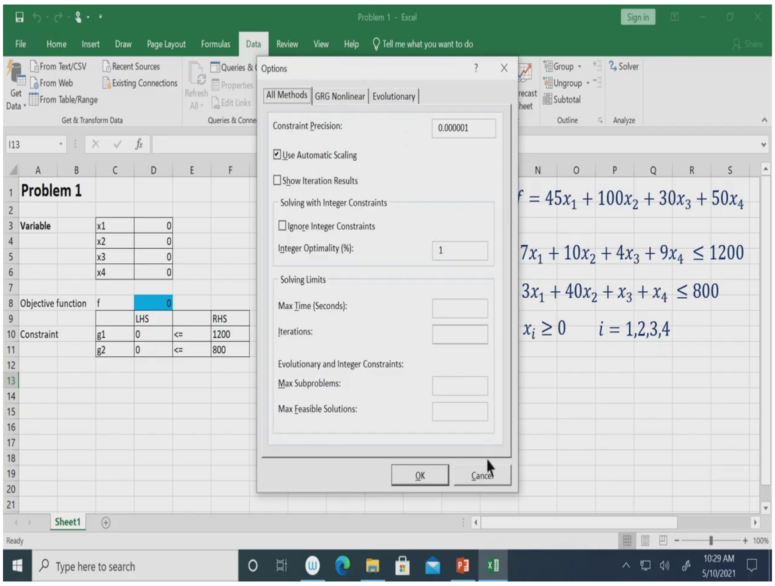

So, you can go to option and you can change the parameter here, but I will use the default parameter. So, I am not changing anything here, so I can solve it. So, if I have defined my problem correctly, I should get the solution of the problem. So, let us solve it just see, if it is correct then I will get the solution yes.

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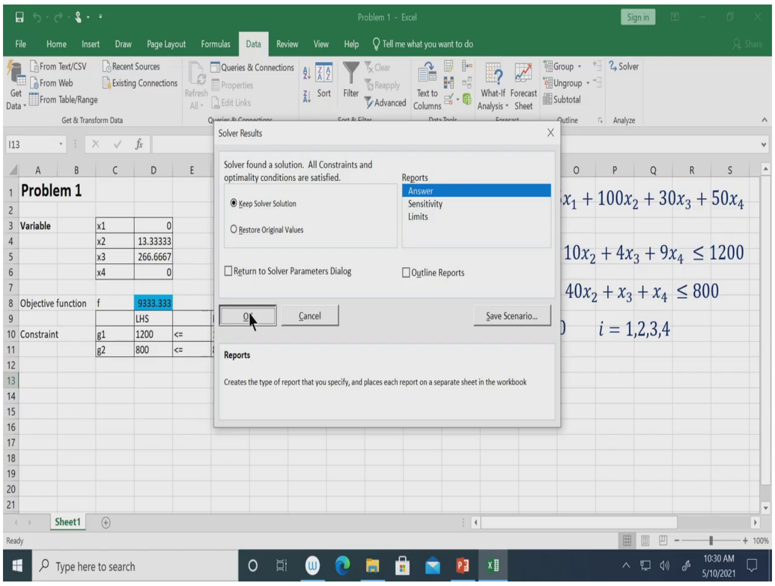
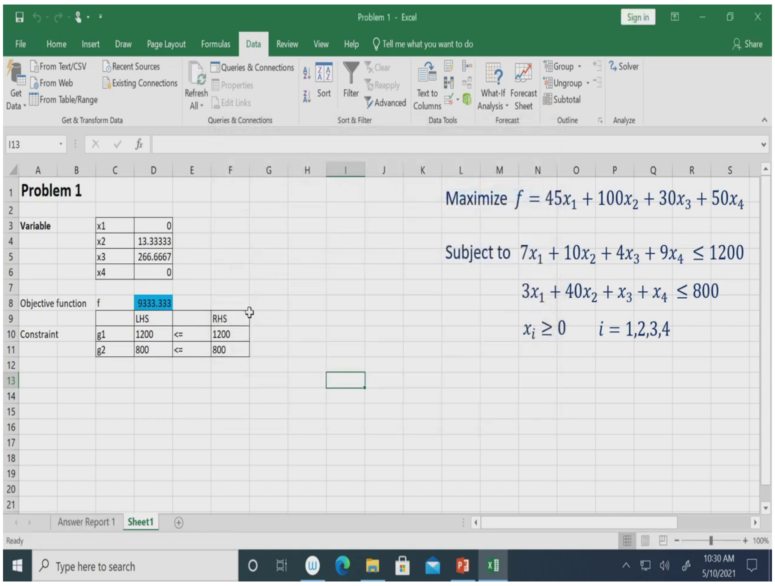


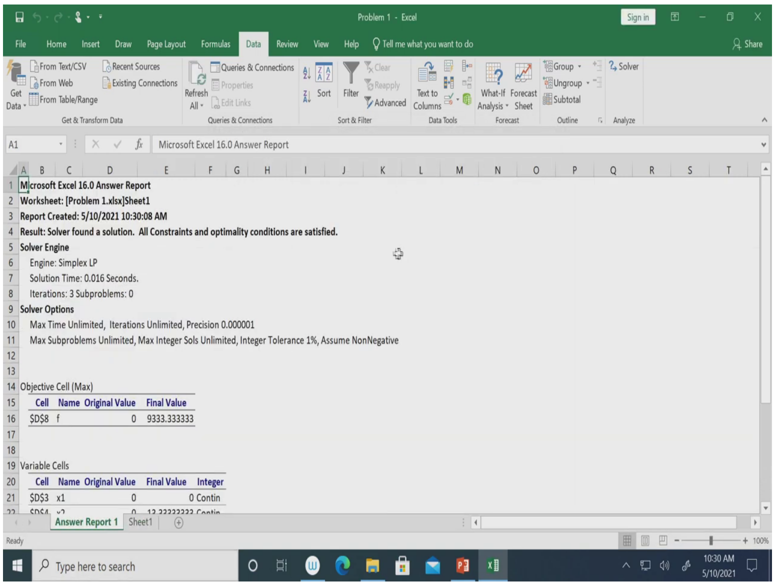
So, solvers solver results showing, that solver found a solution all constraints and optimality condition are satisfied ok. Now, let us go to answer.

(Refer Slide Time: 35:51)

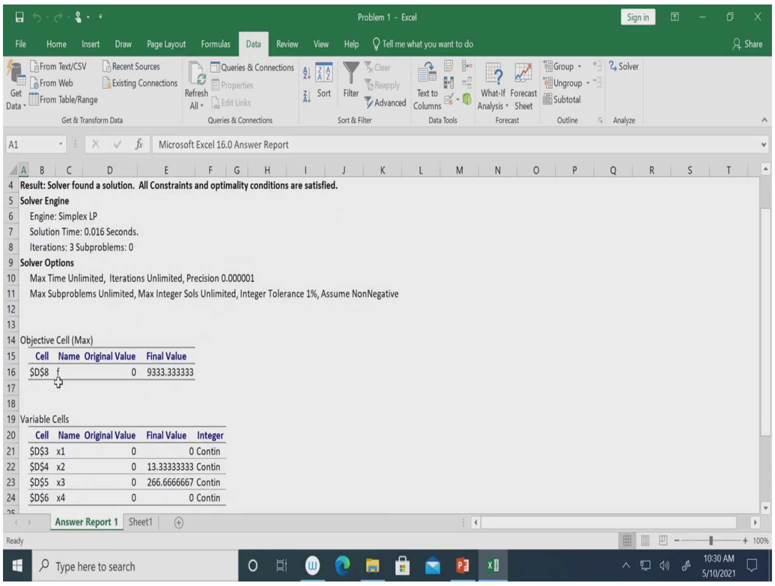


So, if I go to answer then I should see the answer here.

(Refer Slide Time: 35:54)


Problem 1 - Excel
Microsoft Excel 16.0 Answer Report
Worksheet: [Problem 1.xlsx]Sheet1
Report Created: 5/10/2021 10:30:08 AM
Result: Solver found a solution. All Constraints and optimality conditions are satisfied.
Solver Engine
Engine: Simplex LP
Solution Time: 0.016 Seconds.
Iterations: 3 Subproblems: 0
Solver Options
Max Time Unlimited, Iterations Unlimited, Precision 0.000001
Max Subproblems Unlimited, Max Integer Sols Unlimited, Integer Tolerance 1%, Assume NonNegative
Objective Cell (Max)
Cell Name Original Value Final Value
D8 f 0 9333.333333
Variable Cells
Cell Name Original Value Final Value Integer
D3 x1 0 0 Contin
Answer Report 1
Sheet1

(Refer Slide Time: 35:56)

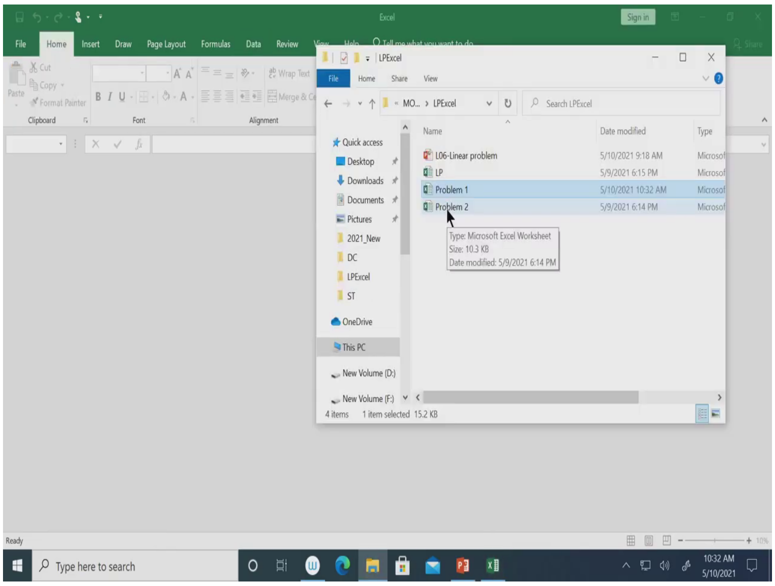


So, this is the answer report and you can see that, the objective function cell is now 9333 ok. So, that is 9333, I already solved this problem using simplex method and the maximum benefit you can earn is 9333. So, I got the solution.

And, the solutions are the x 1 equal to 0, x 2 equal to 13.33 and x 3 equal to 266.67. So, that is the solution already we got we got 13 and 267 ok. So, and other x 4 equal to 0. So, x 1 equal to 0, x 2 equal to 13 and x 3 equal to 266.67 or you can say 267 unit ok. So; that means, we got the solution of this particular problem.

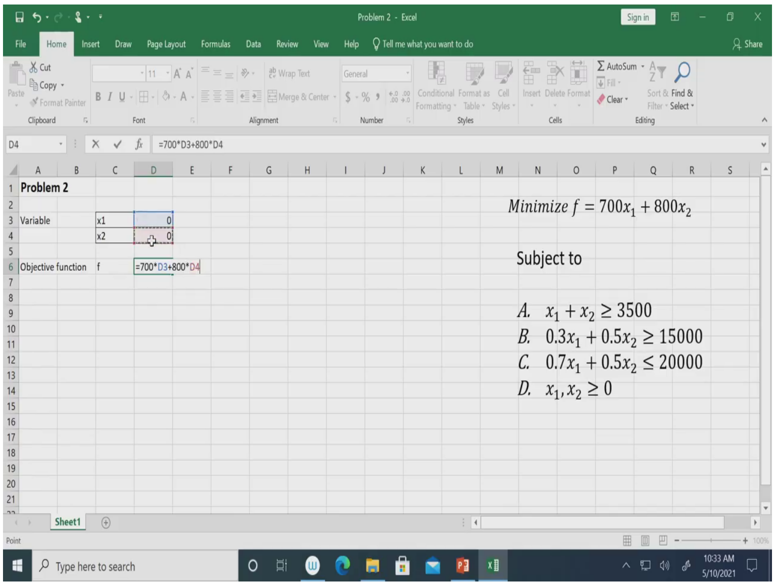
You can also see here, that now x 1 equal to 0, x 2 equal to 13.33, x 3 equal to 266.67 and you got the solution here also. So, you can see that, this is the solution of this problem and here you can see that, the left hand side is now 1200 and this is 800 and which is basically equal to less than equal to 1200 and 800 ok. So, I can see the solution here also or I can see the answer report.

(Refer Slide Time: 37:28)



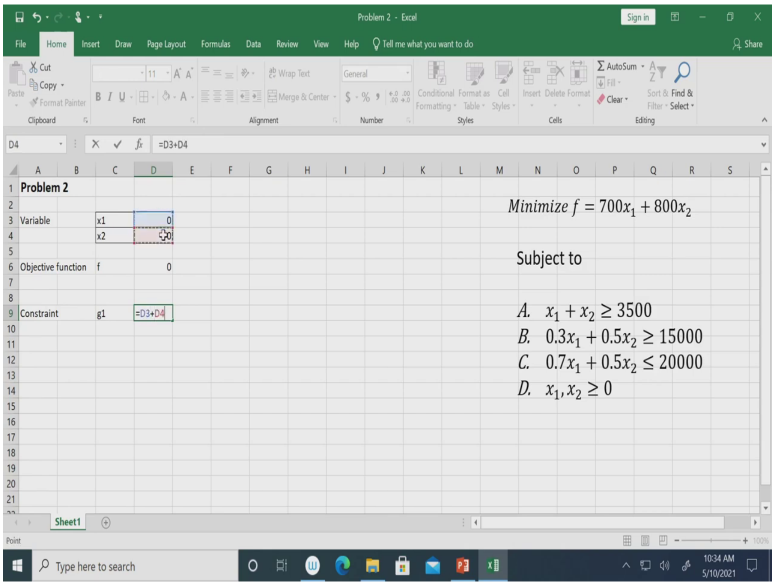
Now, let us solve the Problem 2.

(Refer Slide Time: 37:31)



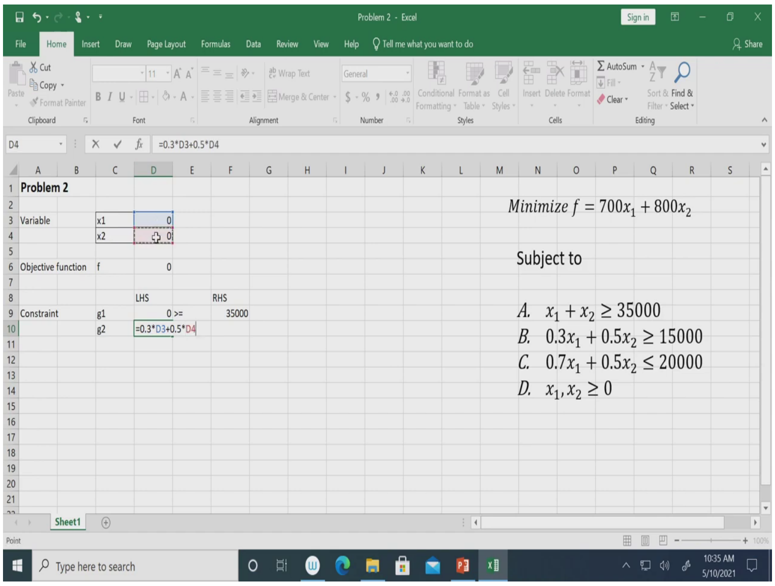
So, this is problem 2 and this is a minimization type problem, minimize f equal to 700 x 1 plus 800 x 2 and we have this constraint 4 constraints. So, here also you define the variable. So, we have two variable here that is x 1 and x 2 and I would like to put a initial value of 0 and 0. So, this is let us define the objective function. So, that is f, f equal to 700 star x 1 plus 800 star x 2.

(Refer Slide Time: 38:22)



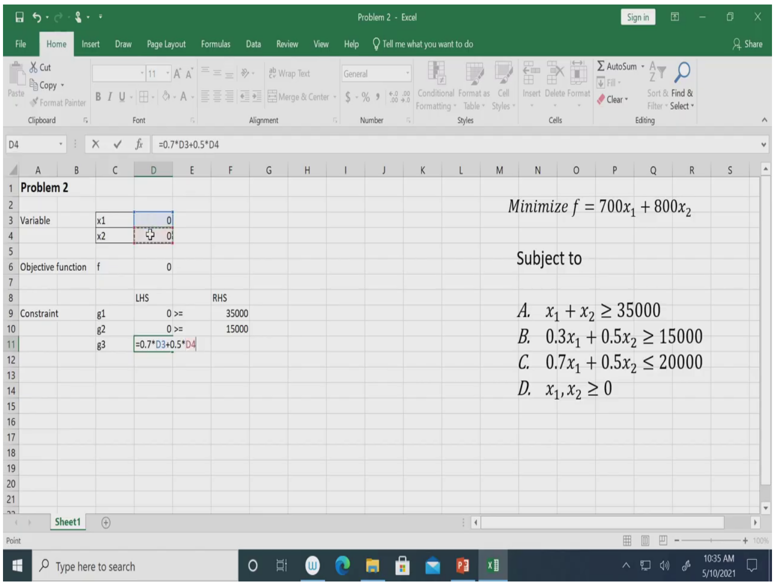
So, this is my objective function. So, let us define constraint. So, we have three constraints here that is g 1 equal to x 1 plus x 2.

(Refer Slide Time: 38:45)



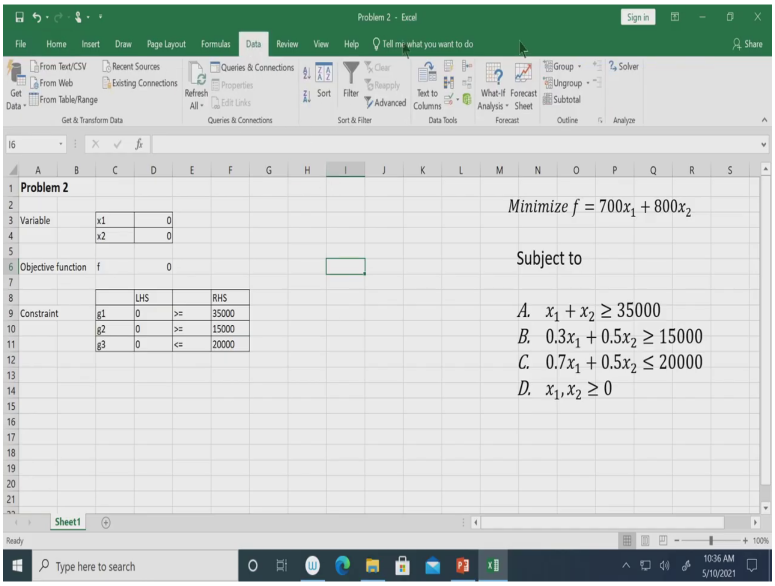
So, you can say this is left hand side and this is right hand side. So, this is the left hand side is x 1 plus x 2, this is greater than equal to this should be 35,000 ok. Then, g 2 equal to 0.3 star x 1 plus 0.5 star x 2.

(Refer Slide Time: 39:29)



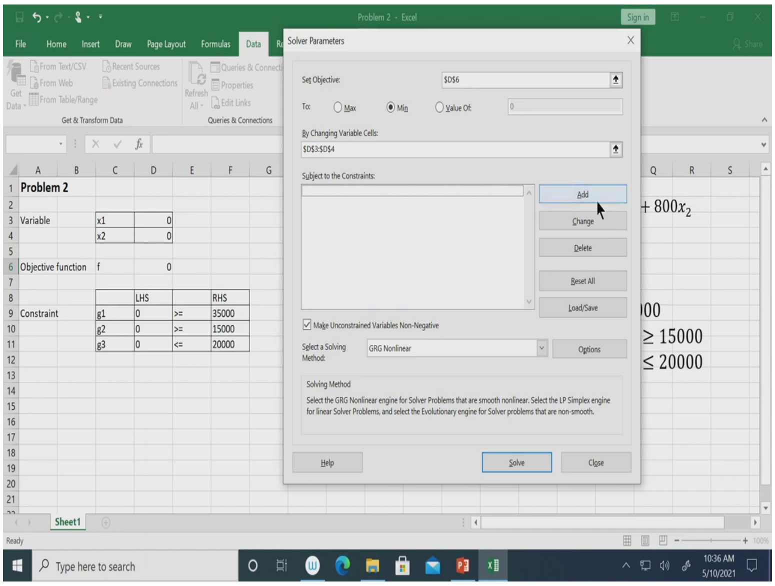
And, this is greater than equal to 15,000 and g 3 equal to 0.7 star x 1 plus 0.5 star x 2, and this is less than equal to 20,000.

(Refer Slide Time: 39:54)



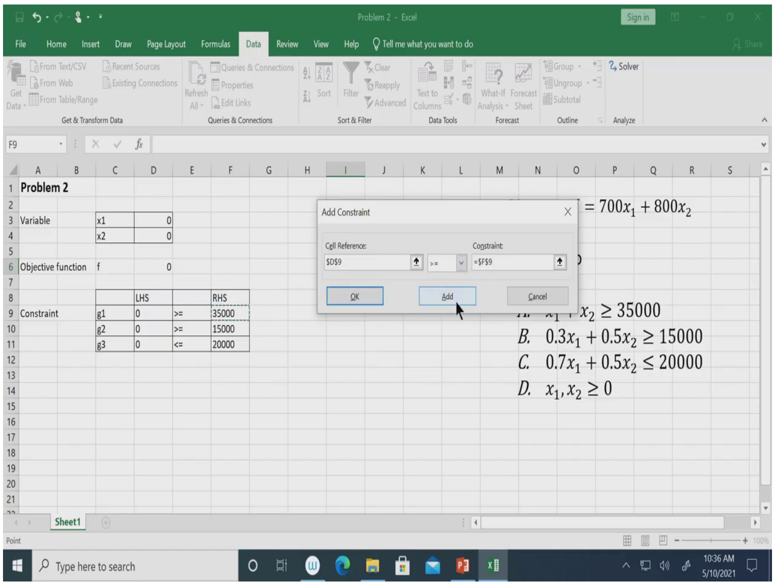
So, I have defined the constraints here all the constraints ok. So, g 1, g 2 and g 3 so, I have defined here now let us solve using Excel Solver.

(Refer Slide Time: 40:22)



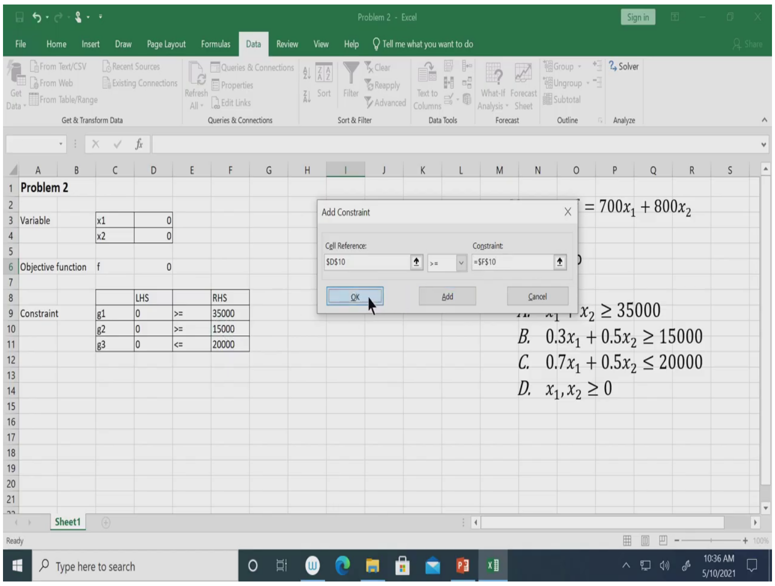
So, you go to data, then use solver. So, here first you define the objective function. So, this is a objective function and now this is a minimization type problem. So, therefore, you change it to minimization and by changing these two cell, that is D 3 and D 4 and define the constraint here.

(Refer Slide Time: 40:44)



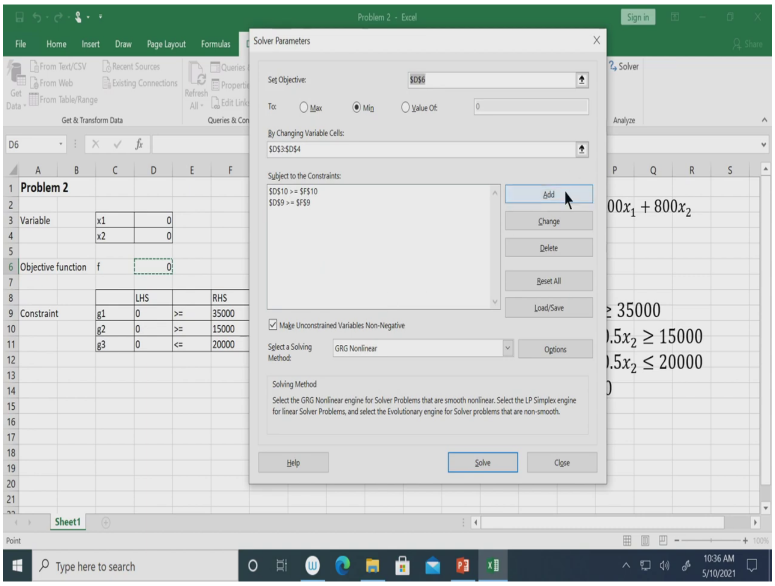
The constraint the first constraint is this is the left hand side of the first constraint and this is greater than equality type. So, this is greater than equal to 35,000, so you add it.

(Refer Slide Time: 41:01)



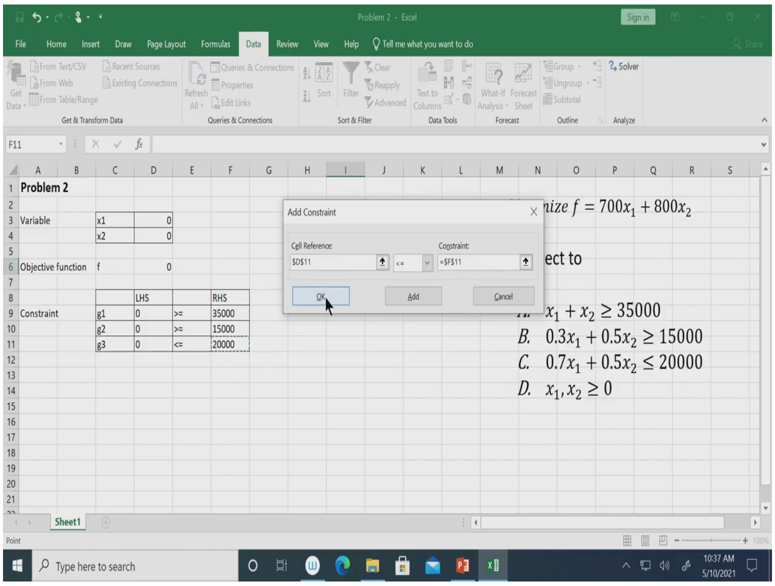
Then, this is the second constraint left hand side. Now it is also greater than equality type and you define right hand side ok.

(Refer Slide Time: 41:12)



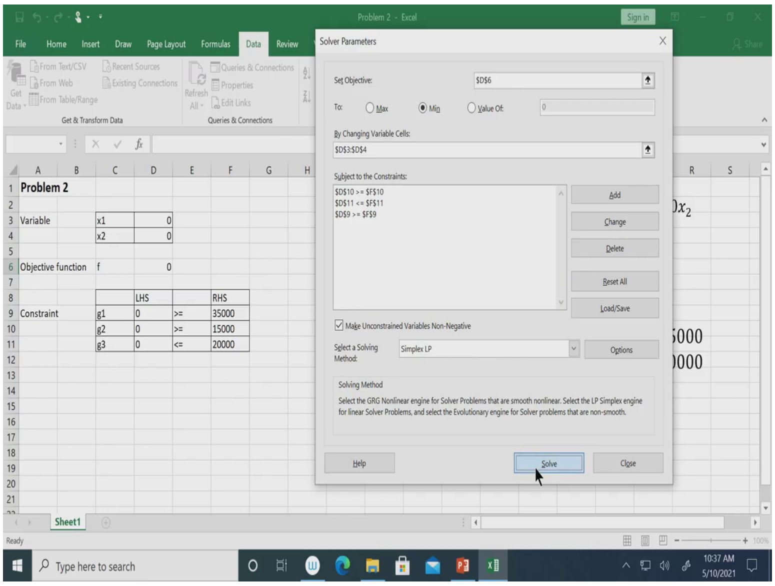
I have another constraint. So, you go there.

(Refer Slide Time: 41:14)



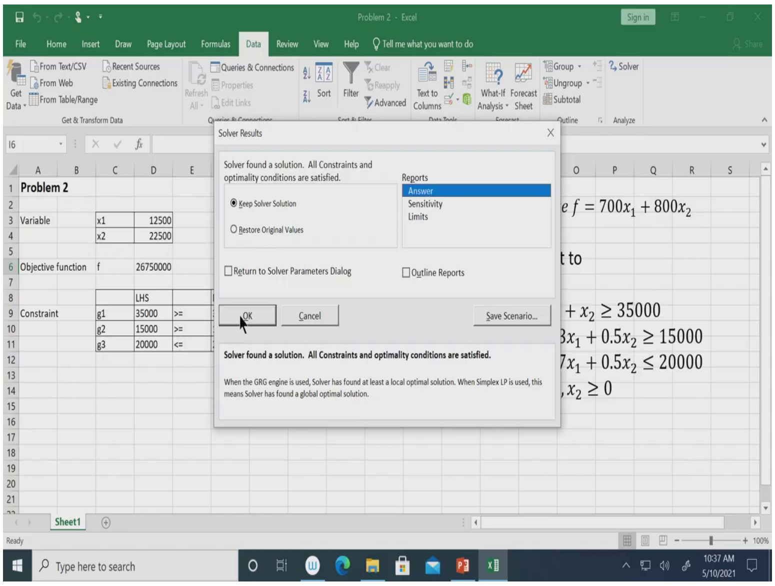
Then, this is the left hand side and this is less than equality type and right hand side is 20,000.

(Refer Slide Time: 41:26)



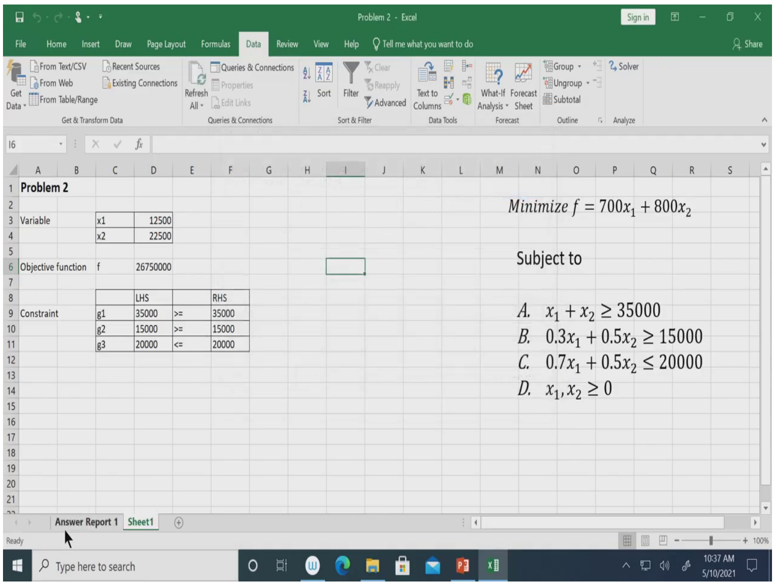
So, you just see I have defined all these three constraints here. First one is greater than equality type, then this is also greater than equality type and this one is less than equality type ok. So, now, I will use simplex L P. Now, let us see if I have defined the problem correctly I should get the solution yes.

(Refer Slide Time: 41:55)

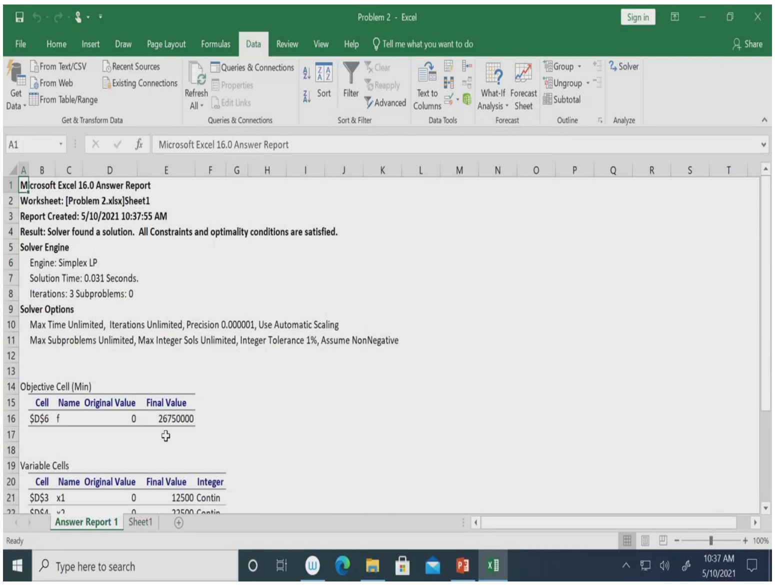


So, I am getting the solution you just see that x 1 equal to 12,500 and x 2 equal to 22,500, let us see the answer.

(Refer Slide Time: 42:09)



(Refer Slide Time: 42:10)



Microsoft Excel 16.0 Answer Report
Worksheet: [Problem 2.xlsx]Sheet1
Report Created: 5/10/2021 10:37:55 AM
Result: Solver found a solution. All Constraints and optimality conditions are satisfied.
Solver Engine
Engine: Simplex LP
Solution Time: 0.031 Seconds.
Iterations: 3 Subproblems: 0
Solver Options
Max Time Unlimited, Iterations Unlimited, Precision 0.000001, Use Automatic Scaling
Max Subproblems Unlimited, Max Integer Sols Unlimited, Integer Tolerance 1%, Assume NonNegative

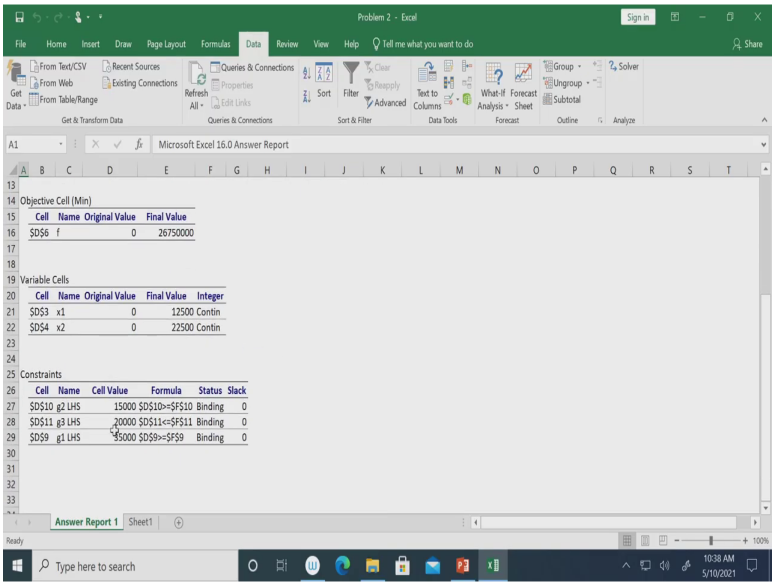
Objective Cell (Min)

Cell	Name	Original Value	Final Value
D6	f	0	26750000

Variable Cells

Cell	Name	Original Value	Final Value	Integer
D3	x1	0	12500	Contin
D4	x2	0	22500	Contin

(Refer Slide Time: 42:11)



The answer report shows the answer report shows that f equal to this is the value of f and then I am getting x 1 equal to 12,500 x 2 equal to 22,500 and you can see the all constraints are satisfied ok. So, you can see this is the all the three constraints are satisfied. The first constraint is greater than equal to 35,000, the second one is greater than equal to 15,000 and third one is less than equal to 20,000 and I we got the solution same problem.

You can see, so, this is the solution of this particular problem you can see the solution is x 1 equal to 12,500 and x 2 equal to 22,500. And, here also we got the solution that x 1 equal to 12,500 and x 2 equal to 22,500.