

**Marketing Analytics**  
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**Lecture 27**  
**Pricing (Contd.)**

Hello everybody, welcome to marketing analytics course, this is Doctor Swagato Chatterjee from VGSOM, IIT Kharagpur. Who is back with this course and today, we will discuss about pricing. So, week 5 is going on and we have been discussing about pricing.

If you remember in one of the earlier presentation earlier videos we talked about bundle pricing, bundling to be a precise and in bundling I discussed that, there are when by chance if the willingness to pay of two different products among various consumers or probably negatively correlated with each other in such kind situations probably bundling works best.

Not always that is something that is the prerequisite there can be other situations were also bundling can work pretty well and such a case study is something that we will be applying here, now what do you see bundling is something that is very important to understand. So, bundling are of two types majorly the one is pure bundling and one is mixed bundling.

Pure bundling means where, the individual items separately are not available the only thing that is available is, the bundled price for example let say, Microsoft office MS Office, you cannot probably buy the individual product separately like a means word, MS excel and etc. You cannot buy separately but, you have to buy the whole bundle product.

Now, what they think is that so I do not they do not exactly know that how much you will use which one, so do you use MS word majorly or do you use MS access majorly or do you use MS excel majorly they do not know that very clearly.

But, they know that these are something which are day to day office work activity tools and there will be some people who will be more of a writer who will focus on the word pad and there would be some people who are modular who will focus on the spreadsheet modeling part and there will be one some people who are presenters will focus on the MS power point part and that is how they create a combination of that and the prices is not dependent on your usage prices is the dependent on your how much is the value that you give.

So, see a guy who is presenter and the guy who is a spreadsheet modular and the guy who is a writer in a same organization might not be very different in the salary unless they are probably somebody who is the CEO and etc. The in terms of their income and etc then those

things will not be very different and they also use a certain portion of that lives time on this particular job.

So, whether you are a writer or whether you are a spreadsheet modular the value that you provide on that particular tool is more or less same which is proportional to the number of amount that you work on that particular tool. So, that is why it has sometimes happens that if I create a combine one single price depending on your job profile, depending on your job status one single price is probably.

For example, whether you are a student of management or whether you are the student of engineering or whether you are the student of arts subject. When you are student, your income is up to x amount, when you are an entry level professional your income is y amount. So, the value that you put on this particular product some more or less same not very different so, in such kind of a situations the pure bundling works.

Now, mixed bundle is a different situation, what is mixed bundle, you have been ever gone to let say pizza hut or dominos where you will see that there is a package dinner available so, meal for 2 or meal for 4 or something, where 2 medium size pizzas, 2 starters or side dishes, 2 cold drinks which are either the Pepsi or Coke and then some other items.

Now, this itself is a bundled. But along with the bundle all of these things can be separately brought also. So, you can separately buy one pizza and one. So, let say you do not like the fries you do not like the finger chips so, you might not want to buy finger chips and that is why you can also if you want separately by a medium size pizza and a cold drinks or two cold drinks or whatever depending on how many guys you have.

So, that is something which is mixed bundling where the bundle is also present and the individual pricing is also present. Now, another key example is, probably let say the packages that we have created after the digitization of TV where all the products there is a TV channel provide as a giving or coming under the package.

Now, you can buy a package and then you can buy add on so what example I remember in around 4-5 years back, I had one of the dish service provider let say Tata sky and then, the Tata sky had a basic package and then there was a top up that so, Bengali channels or Odia channels or Hindi channels and then games channels and etc.

So, those kind of top ups are actually, you can also consider them as a package so, then top up has four things and then there was some price. So, I do not know if you are a customer of

let say sports channels I do not know whether you are fan of ten sports or ESPN or star sport or Fox. But I know that you generally like sports and all the sports comes under this 4, 5 channels Fox, ESPN, Set max we have at some part of time a star sport and etc all four these four and five channels will actually give you all the sports that is happening.

So, if I can put them in the package and I know that this guy is looking for a evening kind of entertainment and he is ready to pay around let say 2 rupees, 3 rupees per night of entertainment. So, 120 rupees per month of entertainment and I will change the accordingly so, that is something is where the mixed bundling comes up.

So, you can also buy the individual one single channel separately for a price of let say 10 rupees, 20 rupees, 40 rupees per month. Or you can also buy a bundle at a price of 120 rupees per month.

Now, heavily similar things are heavily seen in let say mobile phone let say right now take connection and you have in Jio or Vodafone or Airtel you have certain free in network free and right now out network some minimal price that you have to pay and then there are 100 SMS are free and then the data is absolutely up to 1.5 GB it is high speed and after that there is low speed but, absolutely free and something like that.

So, all of these things are comes under a package and you cannot enough this one is often times this one is a also a mixed bundling, where you can also get a top up so, let say I have 1.5 GB but I want another 2 GB of internet special as a next so I can buy the top up 2 GB of high speed internet as a top up. So, all of these things are there in the market and that is why the pricing of this term becomes very important, how it is done.

Now, if you remember we do the pricing based on the preferences that is shown by the customers now the preferences shown by the customers will be different for different customers. Some customers will be a very particular about the preferences they know and some customers will be a little bit hazy, they do not know which one to buy which one not to buy and etc.

So, what we do is, we let say it is a telecom company or let say it is an entertainment company, TV entertainment company they have huge customer base and this customer base has huge level of heterogeneity, every customer is different, their preferences are different, how much they are willing to pay that is different.

So, what they do is, they collect this data and then they break the whole customers base that is there population into multiple demographic groups we call them strata. It can also be multiple segment we call them probably cluster based sampling.

So, either stratified sampling or cluster based sampling is something that they do so. They break it under stator and from each stator they collect some people and the overall samples demographic should actually follow the population demographic so, if there is 30 % male and 70 female in the population similar thing should be there in the sample also as much as possible so, they try to match that and they create a sample which is 2D presentation of the population.

Now, from that samples they collect the data about peoples expectation, peoples interest about various kinds of or willingness to pay in this particular case about various types of combinations of products or combinations of packages and they want find out that what is the modeling price from that so, that is something that we will do here.

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	Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All
1							
2							
3							
4							
5							
6	Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All
7	5.5	11	5.5	16.5	11	16.5	22
8	19.5	38	5.5	57.5	25	43.5	63
9	30	30	53	60	83	83	113
10	73	72	5	145	78	77	150
11	5	9	18	14	23	27	32
12	5	72	2	77	7	74	79
13	23	39	14.5	62	37.5	53.5	76.5
14	12	24	4	36	16	28	40
15	9.25	10	4.1	19.25	13.35	14.1	23.35
16	25	31	33	56	58	64	89
17	40	51	23	91	63	74	114
18	24	25	25	49	49	50	74
19	17	39	25	56	42	64	81

So, if you have seen there is a bundling dot excel file that has been given to us, and this particular file has certain customers preferences of willingness to pay that has been given so, the for the first customer it is 5.5, 11 and 5.5 again for internet TV and cellphone. For the second customer it is 19.5 for internet, 38 dollars let say of rupees whatever I do not know, for TV and 5.5 for cellphone and so on.

So, that kind of preferences given, now these are individual product based preference and we want to know that what is the preference of the customers in terms of their, in terms of the packages. Now, there are 3 items that is there like, internet TV and cellphone now, internet

TV and cellphone can be sold separately and they can also be sold in a bundle and how many different kind of bundles can be created. Internet + TV is one bundle, internet + cellphone is another bundle, TV + cellphone is another bundle, and all of them together is the last bundle so, these are the four bundles that can be created out of this thing.

Now, I as a marketing manager want to know that what will be the pricing such that I will maximize my profit or in this case maximize my revenue, and what should be the pricing for that, and should I go for individual pricing should I go for mixed pricing. If I go for mixed pricing then what should be the pricing of this all the 7 options, like internet TV cellphone, internet + TV, internet + cellphone and TV, and TV + cellphone and also, all of these options what are the various options that I have is something that we are trying to check.

Now, to do that what I will do is that I will also, first I will find out that what is the willingness to pay of the customer for the packages so, what is a total value that they are getting once they buy the package. So, what I do is I will just include here, 4 more cells and I will copy it probably sorry, I will copy what I will copy these four and paste it here.

So, how much they are getting value when it is internet + TV, that value is basically, this one internet + TV, so  $B7 + A7$  comes up to be I think 16.5, what is for internet + cellphone, internet is 5.5 + cellphone is another 5.5 comes up to be 11. And how much for TV + cellphone, that is this is my TV and this is my cellphone, and I am getting TV + cellphone something like this.

So, this is what I am getting till now and I will actually try to do the same thing for all other customers. So, I would try to find out that how the same thing will actually impact for all other customers so, what I will do is I will select this and then drag it up for all customers.

Similarly, the last one for the all options which is nothing but internet + TV + cellphone that is the option that I am getting internet + TV + cellphone and then I am dragging that up for all the customers so this is something that I have done till this point. So, carefully you understand so, what I am focusing, I am focusing on a situation where I have internet TV and cellphone.

People have given me the individual preferences of this products, now I have 4 different kinds of combinations possible internet + TV, is one combination, internet + cellphone is one other combination, TV + cellphone is another combination and all of them together is another combination.

Now, you can choose any one of them as a customer you have this platter in front of you can choose any one of them. Not I as a marketer want to know that if you choose any one of them how much is your willingness to pay or how much is the value that you are getting. Now, if I know how much is the value that you are getting I can actually change charge my prices accordingly which will actually try to take care of this valuation.

Now, I have to make sure the valuation in such that the combined valuation of the all C7 items, whatever revenue that will generate ultimately is maximized because, one particular pricing might suit customer one but might not suit customer two and another pricing might suit customer two might not suit customer three or one or some whatever.

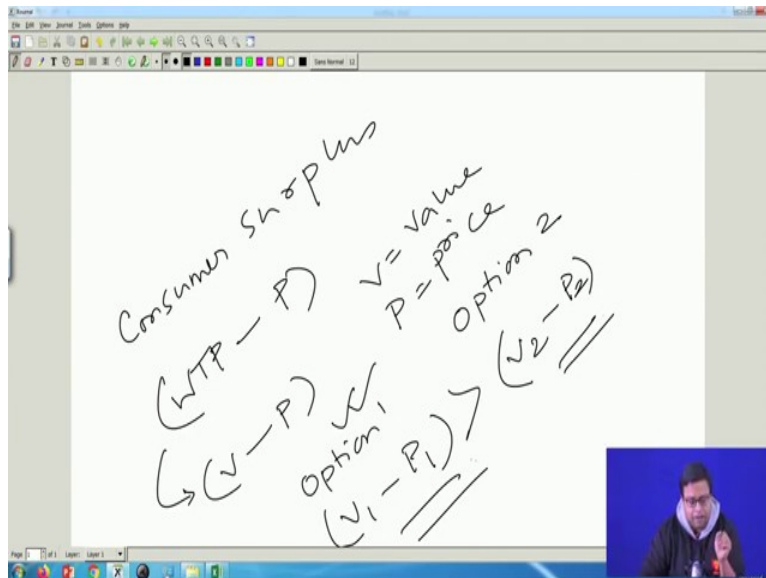
So, I have to find out which combination of prices is the best possible, best possible in terms of what, maximizing revenue. Here the assumption is, at this particular problem the assumption is your unit cost is 0. But if you think that there are unit cost involve and if you think that this unit cost will vary depending in the package.

So, let say I give internet separately and TV separately, my cost is  $c_1$  and  $c_2$  but if I give internet and TV together, sometimes it might happen that it is a cable channel so, the amount of workload is probably little bit low in terms of the installation and etc.

So, the cost is lesser than  $c_1 + c_2$ , so if that is the case then that should be also incorporated, here our assumption is the cost what individual or the package items are 0. So, that based on that assumption we are actually going at.

So, coming back to our problem, we are now focusing on let say these are my things and I am talking about the price so, let say I start with this price that everybody is for every option I am charging 10 rupees, I am charging 10 rupees for every option does not matter. If that is the case then if I am charging 10 rupees for every option then how much is for this first customer how much is the consumer surplus now, if you remember the consumer surplus was.

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I will quickly change the style to plane and the size to let say, so the consumer surplus was what, consumer surplus is how much the consumer is willing to pay so, willingness to pay of the customer - the price that is being charged (WTP-P) or it is also a proxy of  $(V - P)$  where V is the value and P is the price.

Now, we discussed in a different class that somebody will choose option 1, over option 2, when  $V_1 - P_1$  you will choose this one when  $V_1 - P_1$  is higher than  $V_2 - P_2$ . So, for each of them I have to calculate this  $V_1 - P_1$ ,  $V_2 - P_2$  and etc. And find out that which option has highest consumer surplus and the option which was highest consumer surplus were that I will go ahead and do this thing.

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	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	Max Surp
7	11	5.5	16.5	11	16.5	22	-4.5	1	-4.5	6.5	1	6.5	12	
8	38	5.5	57.5	25	43.5	63	9.5	28	-4.5	47.5	15	33.5	53	
9	30	53	60	83	83	113	20	20	43	50	73	73	103	
10	72	5	145	78	77	150	63	62	-5	135	68	67	140	
11	9	18	14	23	27	32	-5	-1	8	4	13	17	22	
12	72	2	77	7	74	79	-5	62	-8	67	-3	64	69	
13	39	14.5	62	37.5	53.5	76.5	13	29	4.5	52	27.5	43.5	66.5	
14	24	4	36	16	28	40	2	14	-6	26	6	18	30	
15	10	4.1	19.25	13.35	14.1	23.35	-0.75	0	-5.9	9.25	3.35	4.1	13.35	
16	31	33	56	58	64	89	15	21	23	46				
17	51	23	91	63	74	114	30	41	13	81				
18	25	25	49	49	50	74	14	15	15	39				
19	39	25	56	42	64	81	7	29	15	46				

	1	2	3	4	5	6	7	Total Revenue
	Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	
	10	10	10	10	10	10	10	
All	Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	Max Surpl Bought
7	22	-4.5	1	-4.5	6.5	1	6.5	12
8	63	9.5	28	-4.5	47.5	15	33.5	53
9	113	20	20	43	50	73	73	103
10	150	63	62	-5	135	68	67	140
11	32	-5	-1	8	4	13	17	22
12	79	-5	62	-8	67	-3	64	69
13	76.5	13	29	4.5	52	27.5	43.5	66.5
14	40	2	14	-6	26	6	18	30
15	23.35	-0.75	0	-5.9	9.25	3.35	4.1	13.35
16	89	15	21	23	46	48	54	79
17	114	30	41	13	81	53	64	104
18	74	14	15	15	39	39	40	64
19	81	7	29	15	46	32	54	71

So, the first one is the internet, internet they are paying 10 dollars and they are willingness to pay is 5.5 dollars so, this is negative basically so, this is 5.5 - 10 dollars. Now, if I just drag it for up to this point, I will see that this one is what, B7 which is the willingness to pay for TV - this value is 4 which is the price for TV. Similarly, where is this value this is C7 which is the willingness to pay for cellphone - price of cellphone and so on.

For example, this one the willingness to pay is 22 and he is paying 10 so, 22 - 10 which is G7 - N4, so I this is the price, now if I drag it till the n before I drag it I have to put all of these in F4 means that means I am actually putting the \$ signs \$ signs means I am fixing them up so, that when I drag I do not face any problem.

So, one by one I will slowly fix them up for each of them I am fixing them up so, I have fixed all my 7 cases up. Now, see this is what actually the coding part comes in now, this is a operation let say there are seven options right now, in a real life situation you have a 500 options if there are lots of TV channels then you have 500 options because, there is a 50 TV channels will have 50 c 1, fifties + 50 c 2 +, 50 c 3 + up to 50 c 50 all of these combinations are possible if there are 50 channels.Right.

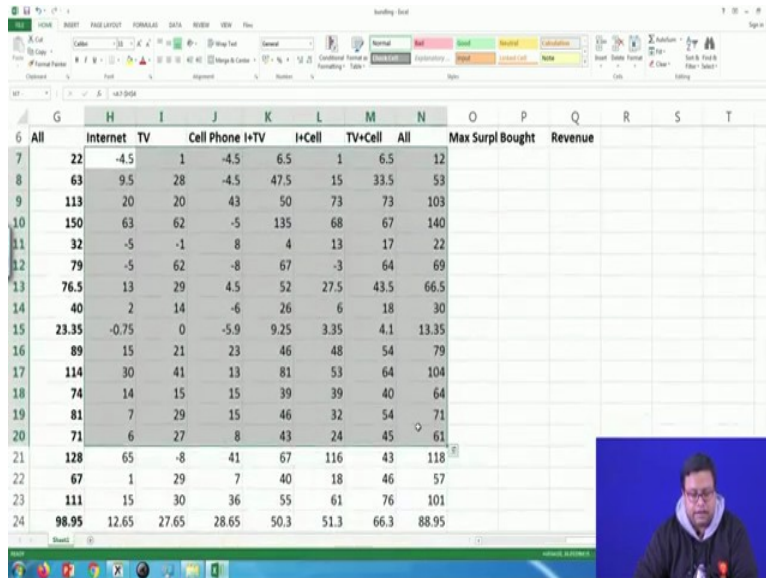
So, effectively there are how much,  $2^{50} - 50 c 1$ , something like that, that many  $50 c 0$ , so  $2^{50} - 1$  that many options will be get created, which is the huge numbers and it is not possible or to do all of these mathematics and etc. Based on such a big number manually so that is where the coding comes in.

So, even whatever spreadsheets we are creating in a real life situation when try so solve a bigger problem you have to use codes excel will not do, or excel even if excel does you as a

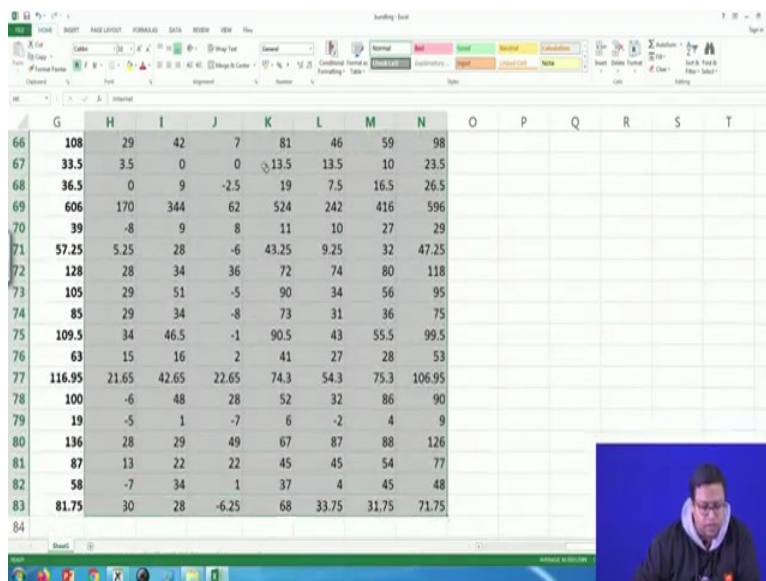


user of excel you cannot do because, then you have to do lots of repetitive jobs just like what I have done right now, fixing them up that is a very simple thing but, you have to do.

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		Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	Max Surpl	Bought	Revenue
7	22	-4.5	1	-4.5	6.5	1	6.5	12			
8	63	9.5	28	-4.5	47.5	15	33.5	53			
9	113	20	20	43	50	73	73	103			
10	150	63	62	-5	135	68	67	140			
11	32	-5	-1	8	4	13	17	22			
12	79	-5	62	-8	67	-3	64	69			
13	76.5	13	29	4.5	52	27.5	43.5	66.5			
14	40	2	14	-6	26	6	18	30			
15	23.35	-0.75	0	-5.9	9.25	3.35	4.1	13.35			
16	89	15	21	23	46	48	54	79			
17	114	30	41	13	81	53	64	104			
18	74	14	15	15	39	39	40	64			
19	81	7	29	15	46	32	54	71			
20	71	6	27	8	43	24	45	61			
21	128	65	-8	41	67	116	43	118			
22	67	1	29	7	40	18	46	57			
23	111	15	30	36	55	61	76	101			
24	98.95	12.65	27.65	28.65	50.3	51.3	66.3	88.95			



		Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	Max Surpl	Bought	Revenue
66	108	29	42	7	81	46	59	98			
67	33.5	3.5	0	0	13.5	13.5	10	23.5			
68	36.5	0	9	-2.5	19	7.5	16.5	26.5			
69	606	170	344	62	524	242	416	596			
70	39	-8	9	8	11	10	27	29			
71	57.25	5.25	28	-6	43.25	9.25	32	47.25			
72	128	28	34	36	72	74	80	118			
73	105	29	51	-5	90	34	56	95			
74	85	29	34	-8	73	31	36	75			
75	109.5	34	46.5	-1	90.5	43	55.5	99.5			
76	63	15	16	2	41	27	28	53			
77	116.95	21.65	42.65	22.65	74.3	54.3	75.3	106.95			
78	100	-6	48	28	52	32	86	90			
79	19	-5	1	-7	6	-2	4	9			
80	136	28	29	49	67	87	88	126			
81	87	13	22	22	45	45	54	77			
82	58	-7	34	1	37	4	45	48			
83	81.75	30	28	-6.25	68	33.75	31.75	71.75			

Anyway, so I am selecting this and I am basically dragging them up, up to the end so, when I drag them up, up to the end this is the values that I get these values are what, each of these values that you get here so, I will just color code it quickly so, each of these values that you get here are basically.

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	All	Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	Max Surpl Bought	Revenue
7	22	-4.5	1	-4.5	6.5	1	6.5	12	12	=if(O7>0,match(O7,H7:N7,0),0)
8	63	9.5	28	-4.5	47.5	15	33.5	53	53	
9	113	20	20	43	50	73	73	103	103	
10	150	63	62	-5	135	68	67	140	140	
11	32	-5	-1	8	4	13	17	22	22	
12	79	-5	62	-8	67	-3	64	69	69	
13	76.5	13	29	4.5	52	27.5	43.5	66.5	66.5	
14	40	2	14	-6	26	6	18	30	30	
15	23.35	-0.75	0	-5.9	9.25	3.35	4.1	13.35	13.35	
16	89	15	21	23	46	48	54	79	79	
17	114	30	41	13	81	53	64	104	104	
18	74	14	15	15	39	39	40	64	64	
19	81	7	29	15	46	32	54	71	71	

These are consumer surplus of the customers this particular cells are consumer surplus of the customers. So, the if you chooses the options internet, he will have a consumer surplus - 4.5 if he choose a option of internet + TV, he gets an option of it is consumer surplus of + 6.5. Now, the question comes is, which one will he choose, if these are the seven options tell me which one will somebody choose, the one which has the highest consumer surplus so, which one has the highest consumer surplus 12.

Similarly, for this one which one is the highest consumer or some still the last one so, you will see where most of the cases the last one will have the highest consumer surplus because, the pricing is all for all of them is same but there is not the real life situation so will later modify that.

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	I+TV	I+Cell	TV+Cell	All	Total Revenue		
3	10	10	10	10	770		
6	I+TV	I+Cell	TV+Cell	All	Max Surpl Bought	Revenue	
7	6.5	1	6.5	12	12	7	10
8	47.5	15	33.5	53	53	7	10
9	50	73	73	103	103	7	10
10	135	68	67	140	140	7	10
11	4	13	17	22	22	7	10
12	67	-3	64	69	69	7	10
13	52	27.5	43.5	66.5	66.5	7	10
14	26	6	18	30	30	7	10
15	9.25	3.35	4.1	13.35	13.35	7	10
16	46	48	54	79	79	7	10
17	81	53	64	104	104	7	10
18	39	39	40	64	64	7	10
19	46	32	54	71	71	7	10

	Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	Total Revenue							
4	10	10	10	10	10	10	10	770							
6	Cell Phone	I+TV	I+Cell	TV+Cell	All	Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	Max Surpl Bought	Revenue	
7	5.5	16.5	11	16.5	22	-4.5	1	-4.5	6.5	1	6.5	12	12	7	10
8	5.5	57.5	25	43.5	63	9.5	28	-4.5	47.5	15	33.5	53	53	7	10
9	53	60	83	83	113	20	20	43	50	73	73	103	103	7	10
10	5	145	78	77	150	63	62	-5	135	68	67	140	140	7	10
11	18	14	23	27	32	5	1	8	4	13	17	22	22	7	10
12	2	77	7	74	79	-5	42	8	67	-3	64	69	69	7	10
13	14.5	62	37.5	53.5	76.5	13	29	45	52	27.5	43.5	66.5	66.5	7	10
14	4	36	16	28	40	2	14	-6	26	6	18	30	30	7	10
15	4.1	19.25	13.35	14.1	23.35	-0.75	0	-5.9	9.25	3.35	4.1	13.35	13.35	7	10
16	33	56	58	64	89	15	21	23	46	48	54	79	79	7	10
17	23	91	63	74	114	30	41	13	81	53	64	104	104	7	10
18	25	48	49	50	74	14	15	15	39	39	40	64	64	7	10
19	25	56	42	64	81	7	29	15	46	32	54	71	71	7	10
20	18	53	34	55	71	6	27	8	43	24	45	61	61	7	10
21	51	77	126	53	128	65	-8	41	67	116	43	118	118	7	10
22	17	50	28	56	67	1	29	7	40	18	46	57	57	7	10
23	46	65	71	86	111	15	30	36	55	61	76	101	101	7	10
24	38.69	60.3	61.3	76.3	98.99	12.65	27.65	28.65	50.3	51.3	66.3	88.99	88.99	7	10
25	5	29.75	11.75	28	34.75	-3.25	13	-5	19.75	1.75	18	24.75	24.75	7	10
26	26	45.5	31	46.5	71.5	15	10.5	16	35.5	41	36.5	61.5	61.5	7	10
27	44.65	68.3	75.3	83.3	113.95	20.65	28.65	34.65	59.3	65.3	73.3	103.95	103.95	7	10
28	33	15	43	38	48	0	-5	23	5	33	28	38	38	7	10
29	15.5	41	38.5	53.5	76.5	13	28	5.5	51	28.5	43.5	66.5	66.5	7	10
30	32.65	105.3	63.3	107.3	137.95	20.65	64.65	22.65	95.3	53.3	97.3	127.95	127.95	7	10

But, right now what is the maximum surplus is, the maximum surplus is maximum of this particular row, where of maximum of the row, that is the maximum surplus out of this thing and which one he did he buy he bought so, only if this maximum is the surplus is positive, if the all the maximum surplus is negative by chance then he did not buy anything.

If by chance at least the maximum surplus is positive, then only the question comes what is the question. Then, match this value in this cell, and match type is 0, that means exact match just check, what did I write here, match O7 that means match this value 12 in this row which is H7 to N7 and ,0 means exact match it has to be exact match otherwise, 0.

So, that means if the consumer surplus is positive, then only he is buying something if it is negative or 0 then he is not buying anything so, that value comes up to be 0, when he is

buying something what he is buying, match the maximum surplus in this column in this row, and tell me what the match happens whatever the match happens then that is the that serial number is something that he is going to buy.

Now, match can happen in multiple places for example, let say in this particular case there can be cases now, I cannot see an example right now but there can be cases where 2-3 things might have, same consumer surplus so, he in that case might want to buy any one of them does not matter he is in different of buying any one of them. So, you, it is better for our, this thing to choose the first one so, I have done that and if I just drag it up.

All things are coming 7 because, the prices are same at the top if we see, then what is the revenue, if I buy 7 if this guy buys 7 then what is a revenue, corresponding revenue is 10 rupees if by chance it was 2 then this value whatever was written here will would have been the revenue so that is what I write here.

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	1	2	3	4	5	6	7			
Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All		Total Revenue		
10	10	10	10	10	10	10	10			
All	Internet	TV	Cell Phone	I+TV	I+Cell	TV+Cell	All	Max Surpl	Bought	Revenue
7	22	-4.5	1	-4.5	6.5	1	6.5	12	12	=HLOOKUP(P7,H2:N4,3,FALSE)
8	63	9.5	28	-4.5	47.5	15	33.5	53	53	7
9	113	20	20	43	50	73	103	103	103	7
10	150	63	62	-5	135	68	67	140	140	7
11	32	-5	-1	8	4	13	17	22	22	7
12	79	-5	62	-8	67	-3	64	69	69	7
13	76.5	13	29	4.5	52	27.5	43.5	66.5	66.5	7
14	40	2	14	-6	26	6	18	30	30	7
15	23.35	-0.75	0	-5.9	9.25	3.35	4.1	13.35	13.35	7
16	89	15	21	23	46	48	54	79	79	7
17	114	30	41	13	81	53	64	104	104	7
18	74	14	15	15	39	39	40	64	64	7
19	81	7	29	15	46	32	54	71	71	7

We know what we look up sorry, h lookup, h lookup this particular value in which table, in this table h lookup will actually search in the first row Vlookup searches when you give a table in the first column so, here h lookup means the first row it will search and whenever you get the match corresponding third row is something from where you want the value and again the this thing is exact match for exact match for exact match you have to write false, so just check the syntax of h lookup what this h lookup means you will understand what this h lookup is.

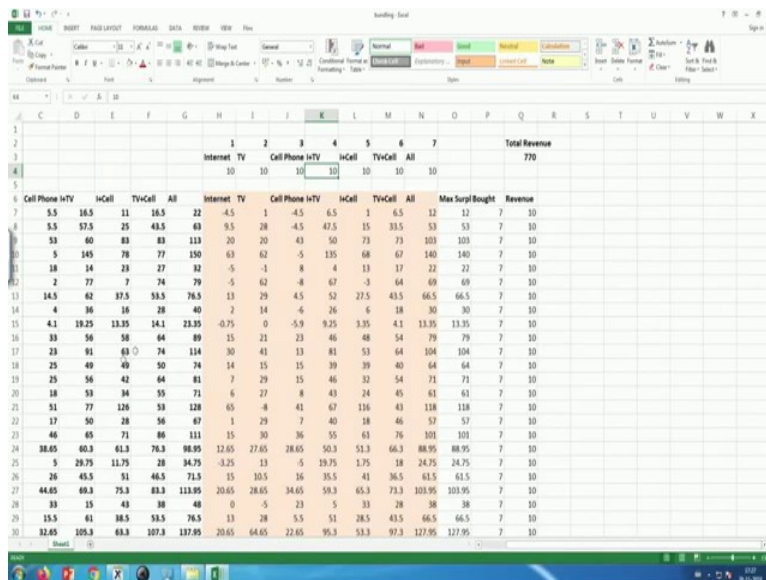
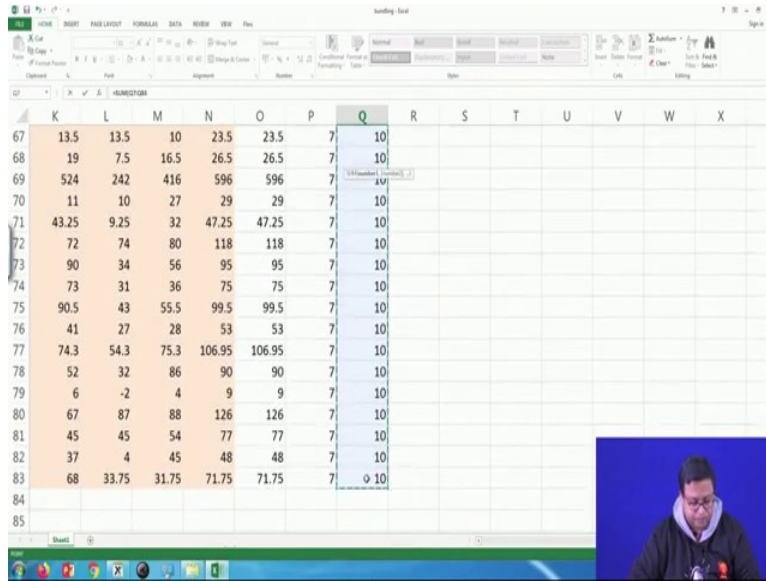
(Refer Slide Time: 25:10)

	I-TV	I-Cell	TV+Cell	All	Max Surpl Bought	Revenue
7	6.5	1	6.5	12	12	7
8	47.5	15	33.5	53	53	7
9	50	73	73	103	103	7
10	135	68	67	140	140	7
11	4	13	17	22	22	7
12	67	-3	64	69	69	7
13	52	27.5	43.5	66.5	66.5	7
14	26	6	18	30	30	7
15	9.25	3.35	4.1	13.35	13.35	7
16	46	48	54	79	79	7
17	81	53	64	104	104	7
18	39	39	40	64	64	7
19	46	32	54	71	71	7

So, I get the revenue here and the revenue is I just drag it down the revenue is something like this so, I have to put all of them in the \$ and then I drag it up.

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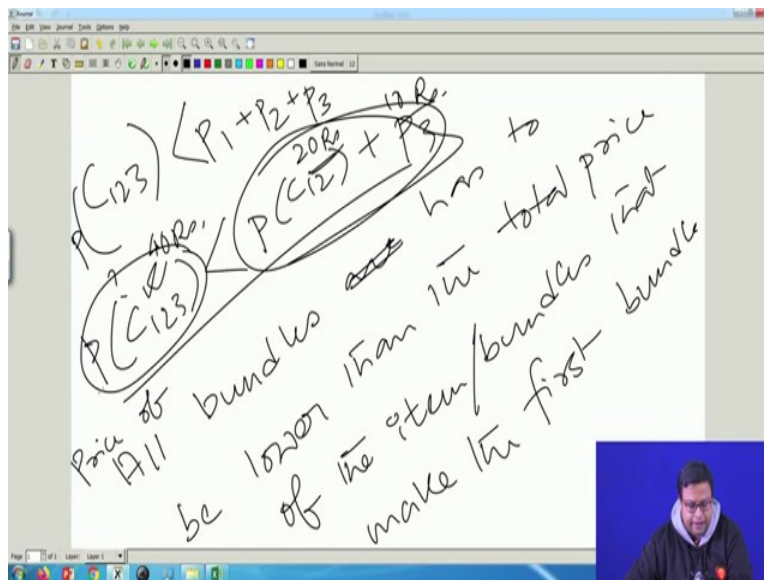
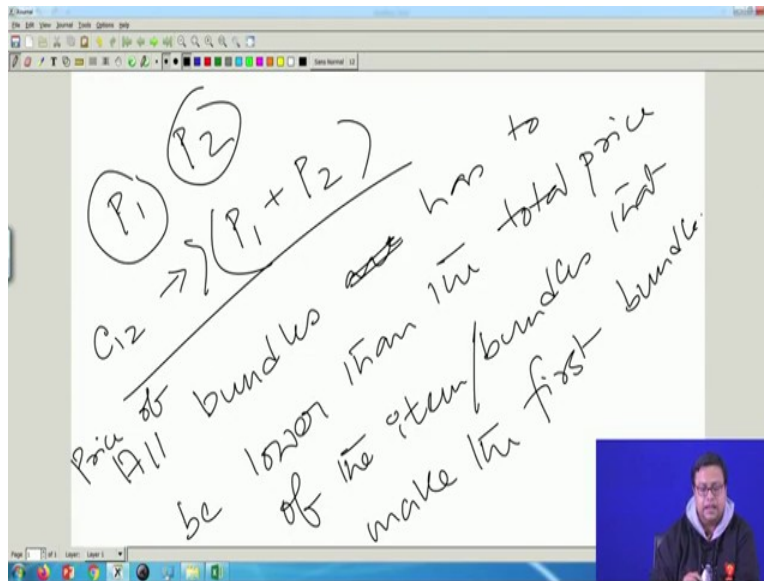
	Internet	TV	Cell Phone	I-TV	I-Cell	TV+Cell	All	Max Surpl Bought	Revenue
3									770
4	10	10	10	10	10	10	10	10	10
7	5.5	16.5	11	16.5	22	4.5	1	4.5	12
8	5.5	57.5	25	43.5	43	9.5	28	43.5	15
9	53	60	83	83	113	20	20	43	50
10	5	145	78	77	150	63	62	5	135
11	18	14	23	27	32	-5	-1	8	4
12	2	77	7	74	79	-5	62	-8	67
13	14.5	62	37.5	53.5	76.5	13	29	4.5	52
14	4	36	16	28	40	7	14	-6	26
15	4.1	19.25	13.35	14.1	23.25	0.75	0	-5.9	3.35
16	33	56	58	64	89	15	21	23	46
17	23	91	63	74	114	30	41	13	81
18	25	49	49	50	74	14	15	15	39
19	25	56	42	64	81	7	29	15	46
20	18	53	34	55	71	6	27	8	43
21	51	77	126	53	128	65	-8	41	67
22	17	50	28	56	67	1	29	7	40
23	46	45	71	86	111	15	30	36	55
24	28.65	60.3	61.3	76.3	98.95	12.65	27.65	28.65	50.3
25	5	29.75	11.75	28	34.75	-3.25	13	-5	19.75
26	26	45.5	51	46.5	71.5	15	10.5	16	35.5
27	44.65	69.3	75.3	83.3	113.95	20.65	28.65	34.65	59.3
28	33	15	43	38	48	0	-5	23	5
29	15.5	61	38.5	53.5	76.5	13	28	5.5	51
30	32.65	105.3	68.3	107.3	137.95	20.65	64.65	22.65	95.3



Fair enough then what is the total revenue the total revenue is as sum of these values, the total revenue is sum of these values, now I have done fairly good amount of job and my job is very simple now I have to maximize this 770 I have to maximize this 770 by doing what, by changing these values that is my job, maximize 770 by changing these values.

Now, there are lots of constraints that I have and I have to understand that, the first constraint is that I cannot have a combine price or package price which is let say I have individual price of sorry, just one minute, let say I have the individual price.

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Of product one is  $P_1$ , and product two is  $P_2$ , the combined price the combination of  $C_{12}$  if that combine price is higher than  $P_1 + P_2$ , then nobody will buy this, because they will get  $P_1$  and  $P_2$  separately. So, all the way all first this thing is that all I would say bundles are the price of all bundles, price of all bundles has to be lower than the total price of the items or bundles that make the first bundle, so this is something that is very important.

What does it mean that means that, if by chance I have a bundle which looks like this if by chance I have a bundle which looks like let say 1, 2, 3 the all bundles I am talking about so the all bundles 1, 2, 3 has to be lower than  $P_1$  and  $P_2$  that is one thing so, the all bundles has to be lower than  $P_1 + P_2 + P_3$ , that is one thing and so, combination of 1, 2, 3 the price of this combination has to be lower than  $P_1 + P_2 + P_3$  that is one thing.  $[P(C_{123}) < P_1 + P_2 + P_3]$

And we have to also understand that the price of C 1, 2, 3 has to be also lower than price of C 1, 2 price of combination of 1, 2 and P3 otherwise I will buying the combination of 1, 2 and P3 separately and I get this thing, why will I buy let say TV internet and mobile phone, TV internet, cellphone, TV and TV internet the combination is available at 20 rupees this is 20 rupees TV internet together.

And let say the cellphone is available at 10 rupees per month, and this rest is charging 40 rupees per month, why will I go for this, what this 20 + 10 is available at 30 rupees combination.

So, then this guy has to be lower than these values as well, which also means which in other words it means that it has to be lower than the rest of the combination so, that is something that we have to take care when we are doing this thing.

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So, what is the maximum for internet + TV, the maximum of internet + TV's cost internet + TV's cost maximum is basically whatever comes up to be here. Similarly, what for cellphone, whatever comes up to be here.

And what is the what for, TV + cell this + this, these are the maximum possible for what is the maximum possible for all, the all maximum is basically so the it has to be the minimum of these 6 guys actually the minimum of, the minimum of what, minimum of sum of these 3 that is number one option second option is, internet + TV + cellphone third option is, internet + cellphone + TV and fourth option is basically TV + cellphone + internet.



So, whatever is mean of this I have to be lower than that that is the maximum value that is possible carefully, we see what did I write what are the various ways, somebody can buy the all combination other than buying the all combination one is, they can buy the all these 3 things individually so my price should be lower than that I can buy combination of 1, 2 and 3 separately that is  $K4 + J4$ .

So, that is something that has to be avoided then,  $L4 + I4$  that should also be avoided and  $M4 + H4$  so, my price should be such that anybody do not go for those combinations. That is something that I will do so, what I will do here, is in my data tab in the solver I am maximizing total revenue that is what I maximizing by changing what by changing these prices.

Now, what are the these things first of all, all these prices has to be  $\geq 0$ , and all the prices has to be  $\leq 100$  so, I am putting them in 0 and 100 add and these 4 guys has to be lower than these 4 guys that is something that I also I am adding up so add anything else, I have to think about.

So, you will also think that it that the what is the lowest possible value of internet + TV or all and etc. The lowest possible value means that I cannot be lower than internet + TV cannot be lower than internet and TV.

The lowest possible is, no so, internet + TV this combination cannot be lower than internet alone or TV alone so, that is something that I have to also, so this is the maximum I will just add up another thing which is the minimum.

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	1	2	3	4	5	6	7							
	Internet	TV	Cell Phone	iTV	iCell	TVCell	All	Total Revenue						
	10	10	10	10	10	10	10	770						
	MIN													
	MAX													
Cell Phone	iTV	iCell	TVCell	All	Internet	TV	Cell Phone	iTV	iCell	TVCell	All	Max Surpl Bought	Revenue	
8.5	16.5	11	16.5	22	-4.5	1	-4.5	6.5	1	6.5	12	12	7	10
5.5	37.5	25	43.5	43	9.5	28	-4.5	47.5	15	33.5	53	53	7	10
58	60	83	89	113	20	20	43	50	73	73	103	103	7	10
5	145	78	77	150	63	42	-5	135	68	67	140	140	7	10
18	14	23	27	32	-5	-1	8	4	13	17	22	22	7	10
2	77	7	74	79	-5	62	-8	67	-3	64	69	69	7	10
14.5	62	37.5	53.5	76.5	13	29	4.5	52	27.5	43.5	66.5	66.5	7	10
4	36	16	28	40	2	14	-6	26	6	18	30	30	7	10
4.1	19.25	13.35	14.1	23.35	-0.75	0	-5.9	9.25	3.35	4.1	13.35	13.35	7	10
33	56	38	44	59	15	21	23	46	48	54	79	79	7	10
23	81	63	74	114	30	41	13	81	53	64	104	104	7	10
25	49	49	50	74	14	15	15	39	39	40	64	64	7	10
25	56	42	64	81	7	29	15	46	32	54	71	71	7	10
18	53	34	55	71	6	27	8	43	24	45	61	61	7	10
51	77	126	53	128	65	-8	41	67	116	43	118	118	7	10
17	50	28	56	67	1	29	7	40	18	46	57	57	7	10
46	65	71	86	111	15	20	26	55	61	76	101	101	7	10
38.65	60.3	63.3	76.3	96.95	12.65	27.65	28.65	56.3	51.3	66.3	88.95	88.95	7	10
5	29.75	11.75	28	34.75	-3.25	13	-5	19.75	1.75	18	24.75	24.75	7	10
26	45.5	51	46.5	71.5	15	10.5	16	35.5	41	36.5	61.5	61.5	7	10
44.65	69.3	75.3	83.3	113.95	20.65	28.65	34.65	59.3	65.3	73.3	103.95	103.95	7	10
33	15	43	38	48	0	-5	23	5	33	28	38	38	7	10
15.5	61	38.5	53.5	76.5	13	28	5.5	51	28.5	43.5	66.5	66.5	7	10

What is the minimum for internet + TV this is minimum of internet , TV this is minimum of internet comma cellphone, and this is minimum of TV comma cellphone and this is what is the minimum value of this the minimum of all these 6 so, I have to be actually maximum of all these 6 is something will be by minimum value I have to be higher than that, that is something that is given.

So, in the solver I will add another thing so, I will add that these 4 guys has to be  $\geq$  these 4 guys, so that is also something that I add up. Now, once I add up this I will use evolution adding because, there are lots of ifs and buts and etc is involve so, integer programming is involved, I will go for evolution adding and I will try to solve this so, I am not now keeping them integer but, you can also want to probably want to keep them integer.

So, I am trying to solve them, and it is already 2159 to 16 to 166 to 1 to 224 to 257 to 259 so I can stop at any point of time by pressing and escape but it is improving so, I will wait for some time and as long as it takes 1 or 2 minutes to get the result and you will get a result which will actually improve your sell.

So, 2261 to 2262 is or 63 is what I have rich till now, but it is still keeping on improving, improving so, you have to understand that, what did I do from the first the first thing is from individual once I got the overall packages value, valuation that people are interested to pay.

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	1	2	3	4	5	6	7	Total Revenue						
MIN	10	9.99999	34.98417	22	38.9995	26	46.9999	2181.99						
MAX	20	44.9842	44.9842	36										
Cell Phone iTV	iCell	TVCell	All	Internet	TV	Cell Phone iTV	iCell	TVCell	All	Max Surpl Bought	Revenue			
5.5	16.5	11	16.5	22	4.5	1.00001	-29.4842	-8.49999	-17.9995	-9.49997	-14.9999	1.00001	2	9.99999
5.5	37.5	25	43.5	43	9.5	28	-29.4842	35.5	-13.9995	17.5	16.0001	35.5	4	22
53	60	83	83	113	20	20	18.01583	38	44.0005	57	66.0001	66.0001	7	46.9999
5	145	78	77	150	63	42	-29.9842	123	39.0005	51	103	123	4	22
18	14	23	27	32	-5	-0.99999	-16.9842	-7.99999	-15.9995	1.00001	14.9999	1.00001	6	26
2	77	7	74	79	-5	62	-32.9842	55	-33.9995	48	32.0001	62	2	9.99999
14.5	62	37.5	53.5	76.5	13	29	-20.4842	40	-1.49954	27.5	29.5001	40	4	22
4	36	16	28	40	7	14	-30.9842	14	-22.9995	2.00001	4.99966	14	4	22
4.1	18.25	13.25	14.1	23.25	-0.75	7.7106	-30.8842	-1.74999	-25.6495	-11.9	-33.6499	7.7106	2	9.99999
33	56	58	64	89	15	21	-1.98417	34	13.0005	38	42.0001	42.0001	7	46.9999
23	91	63	74	114	30	41	-11.9842	69	24.0005	48	67.0001	69	4	22
25	49	49	50	74	14	15	-9.98417	27	10.0005	24	27.0001	27.0001	7	46.9999
25	56	42	64	81	7	29	-9.98417	34	3.00046	38	34.0001	38	6	26
18	53	34	55	71	6	27	-16.9842	31	-4.99954	29	24.0001	31	4	22
51	77	126	58	128	65	-7.99999	16.01583	55	47.0005	27	81.0001	87.0005	5	38.9995
17	50	38	56	67	1	29	-17.9842	38	10.9995	30	20.0001	30	6	26
44	65	71	86	111	15	30	11.01583	43	32.0005	60	64.0001	64.0001	7	46.9999
38.65	60.3	63.3	76.3	96.95	12.65	27.65	3.66583	38.3	22.3005	50.3	51.9501	51.9501	7	46.9999
5	29.75	13.75	28	34.75	-3.25	13	-29.9842	7.75001	-27.2495	2.00001	12.2499	13	2	9.99999
26	45.5	51	46.5	71.5	15	10.5	-8.98417	23.5	12.0005	20.5	24.5001	24.5001	7	46.9999
44.65	69.3	75.3	83.3	113.95	20.65	28.65	9.66583	47.3	36.3005	57.3	66.9501	66.9501	7	46.9999
33	15	43	38	48	0	-4.99999	-1.98417	-4.99999	4.00046	12	1.00014	12	6	26
15.5	61	38.5	53.5	76.5	13	28	-19.4842	39	-4.99954	27.5	29.5001	39	4	22

So, they cannot solve any more so I press okay. So, then I gave some prices at the top to start with and then the prices that I got to start with will be actually make, I have to make sure that the prices will be such that I get the maximum revenue and then this prices, I run this thing I find out the maximum surplus, I find out what if that surplus is positive, how much is the

revenue, calculate the total revenue and I have maximize the total revenue based on certain constraints.

So, this is the price that I got. So, this one is it is not minimum I am actually done it wrong it should be the minimum value is maximum of these two so, this is something that I did wrong I will run once more quickly so, this has to be maximum of the two, not minimum of the two, so, that is something that I did wrong. So, maximum of this and this and this is maximum of all of these things.

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	1	2	3	4	5	6	7	Total Revenue
Internet TV	10	10	10	10	10	10	10	770
Cell Phone InTV	10	10	10	10	10	10	10	
InCell	10	10	10	10	10	10	10	
TVCell	10	10	10	10	10	10	10	
All	10	10	10	10	10	10	10	

	1	2	3	4	5	6	7	Total Revenue
Internet TV	17.9995	9.99997	23.82017	27.9995	35.55	26.9996	36.9994	2240.97
Cell Phone InTV	17.9995	9.99997	23.82017	27.9995	35.55	26.9996	36.9994	
InCell	17.9995	9.99997	23.82017	27.9995	35.55	26.9996	36.9994	
TVCell	17.9995	9.99997	23.82017	27.9995	35.55	26.9996	36.9994	
All	17.9995	9.99997	23.82017	27.9995	35.55	26.9996	36.9994	

	1	2	3	4	5	6	7							
	Internet	TV	Cell Phone	iTV	iCell	TVCell	All	Total Revenue						
	17.8807	9.98615	22.61194	27.7387	38.8355	25.9464	41.7736	2343.66						
	MIN													
	MAX													
	27.8663	40.4921	32.9381	43.8266										
Cell Phone	iTV	iCell	TVCell	All	Internet	TV	Cell Phone	iTV	iCell	TVCell	All	Max Surpl Bought	Revenue	
5.5	16.5	11	16.5	22	-12.3802	1.01385	-17.1119	-11.2387	-25.8355	-9.44642	-19.7736	1.01385	2	9.98615
5.5	57.5	25	43.5	63	1.61983	28.0139	-17.1119	29.7613	13.8355	17.5536	21.2264	29.7613	4	27.7387
53	60	83	83	113	12.1194	20.0139	30.38806	32.2613	46.1645	57.0536	71.2264	71.2264	7	41.7736
5	145	78	77	150	55.1194	62.0139	-17.6119	117.261	41.1645	51.0536	108.226	117.261	4	27.7387
18	14	23	27	32	-12.8802	-0.98615	-4.61194	-13.7387	-13.8355	-9.2736	-1.0536		6	25.9464
2	77	7	74	79	-12.8802	62.0139	-20.6119	49.2613	-29.8355	48.0536	37.2264	62.0139	2	9.98615
14.5	62	37.5	53.5	76.5	5.11983	29.0139	-8.11194	34.2613	0.66448	27.5536	34.7264	34.7264	7	41.7736
4	36	16	28	40	-5.88017	14.0139	-18.6119	8.26132	-20.8355	2.0536	-1.7736	14.0139	2	9.98615
4.1	19.25	13.35	14.1	23.35	-8.63017	0.01385	-18.5119	8.48868	-23.4855	-11.8464	-18.4236	0.01385	2	9.98615
33	56	58	64	89	7.11983	21.0139	10.38806	28.2613	23.1645	38.0536	47.2264	47.2264	7	41.7736
23	91	63	74	114	22.1194	41.0139	0.388057	63.2613	26.1645	48.0536	72.2264	72.2264	7	41.7736
25	49	49	50	74	6.11983	15.0139	2.388057	13.2613	13.1645	24.0536	32.2264	32.2264	7	41.7736
25	56	42	64	81	-0.88017	29.0139	2.388057	38.2613	5.16448	48.0536	39.2264	39.2264	7	41.7736
18	53	34	55	71	-1.88017	27.0139	-4.61194	25.2613	-2.83552	29.0536	29.2264	29.2264	7	41.7736
17	77	126	53	128	57.1194	7.98615	28.38806	49.2613	89.1645	27.0536	86.2264	89.1645	5	36.8355
17	50	28	56	67	-8.88017	29.0139	-5.61194	22.2613	-8.83552	30.0536	25.2264	30.0536	6	25.9464
46	65	71	86	111	7.11983	30.0139	23.38806	37.2613	34.1645	60.0536	69.2264	69.2264	7	41.7736
38.65	60.3	81.3	76.3	98.95	4.70983	27.6639	16.03806	32.5613	24.6645	50.3536	57.1764	57.1764	7	41.7736
5	29.75	11.75	28	34.75	-11.1302	13.0139	-17.6119	2.01132	-25.0855	2.0536	-7.0236	13.0139	2	9.98615
24	45.3	31	46.5	71.5	7.11983	15.5139	3.388057	17.2613	14.1645	20.536	29.2264	29.2264	7	41.7736
44.65	69.3	75.3	83.3	113.95	12.7698	28.6639	22.03806	41.5613	38.6645	57.3536	72.1764	72.1764	7	41.7736
33	15	43	38	48	-7.88017	-4.98615	10.38806	12.7387	6.16448	12.0536	6.2264	12.0536	6	25.9464
15.5	61	38.5	53.5	76.5	5.11983	28.0139	-7.11194	33.2613	1.66448	27.5536	34.7264	34.7264	7	41.7736

So, that is okay so, I will quickly change it to 10 once more all of them to 10, and then I will run it once more so save it solve and solve. So, I did it wrong because, see the individual the package price should be the higher than the maximum of individual price so if the package is available at 10 rupees and individual is available at 5 rupees and 7 rupees, these 10 rupees has to be higher than 7 rupees.

If it is 6 rupees then people will buy the package rather than buy the individual one so, if you have to have a mixed bundling approach all of them purchases all of the prices should be feasible that is here one of the important thing that you try to achieve.

So, if they are not feasible you, there is no point so, that is something that we try to achieve and that is what is should come in your, in the rules that you are setting up. So, I will not run the this thing till end, you can stop at a any point of time so I will stop it, and by stopping it I can see that there are some pricing coming up and 2241 is the revenue that I am getting and based on that revenue, sorry, I will so 2241 was the revenue that I got and 2241 was achieved by having certain prices which were coming up within the ranges so, I will stop here, stop solver ,keep solver solution.

So, 2343 I achieved and 17 so 18 dollar rupees I can say 10 rupees here, and 22 rupees and this is 27, 36, 25 and the overall combination is 41 so, the minimum and the maximum is written and the revenue that I am getting is 2343 so that is how, you generally do a mixed bundling, you can do for multiple products more than probably 3 products and their combinations and you can try to find out the answer.

So, thank you for being with me in this video where we have solved very very tuff very I would say difficult problem and which is also very interesting and which is heavily applied in

our marketing problems and I will meet you with the next video with another pricing problem. Thank you very much.