The following presentation answers a series of questions to provide a solution and answers to the company problemst,problem is to find the right set of stickers where n is the set of stickers to be issued and k is the pack with the number of stickers to be issued. The collections of stickers that the company can issue are for n=200,300,400 collection and the packages for each collection are k=5,6,7,8.The aim is to find the appropriate combination to optimize thecompany profits.

So for each combination we have to calculate the cost and the selling price to give the profit that the company will get.

From the data we have we know that the cost of production for the collection of n=200 is 4 euros, for n=300 the cost is 7 euros and for n=400 the cost is 11 euros. And for each sticker it costs the partner company 0.02 euro, so a packet of k=5 stickers costs the partner company 0.02*k. So the final costs are calculated the cost of production for each collection plus the number of stickers multiplied by 0,02 and multiplied by the number of packets to be bought by the buyer.

The selling price for each package is as follows: for k=5 the selling price of the package is 0.12 multiplied by the number of packages, for k=6 it is 0.15 multiplied by the number of packages, for k=7 it is 0.18 and for k=8 it is 0.2 multiplied by the number of packages to be bought by the buyer.

it is worth mentioning that the packages that will be bought by the buyer will be bought untill completing the album of the current collection e.g. = 400.So in the matrix that i will present the number of packages the buyer will buy is simulated and we will give a very accuracy approximation of the numbers of pachages.

pachage	n	k	sellingprice	totalselprice
234	200	5	0.12	28.141
194	200	6	0.15	29.12
167	200	7	0.18	30.21
142	200	8	0.2	28.57
373	300	5	0.12	44.84
313	300	6	0.15	46.99
266	300	7	0.18	48.00
230	300	8	0.2	46.101
517	400	5	0.12	62.12
431	400	6	0.15	64.77
373	400	7	0.18	67.21
329	400	8	0.2	65.96

Total selling price by different n and k

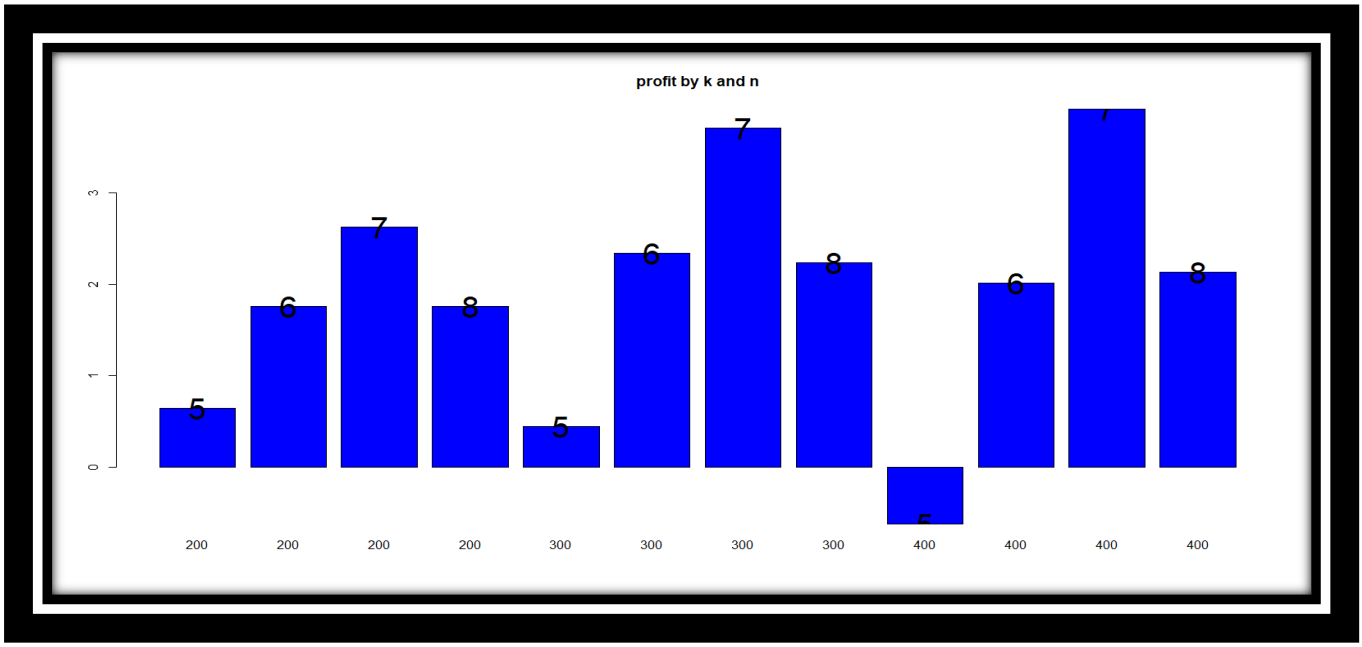
And the total cost by the same combination of n and k as above is

27.451
27.29
27.50
26.86
44.37
44.59
44.33
43.88
62.77
62.81
63.28
63.777

Total cost.

When we take the difference of this table and the above we can see what is the best combination to maximaze the profit.So selling_price-total_cost=profit

With some usefull plots we can understand which is the best combination to maximaze the profits



Profits by n and k

As we can see about the barplot two combination are the highest to maximaze the profits of the company.The first combination is n=300 and k=7 and the second is n=400 and k=7.But the highest profit is gives the combination of n=400 and k=7 and the profit of the company is 3.93 euros almost 4,whith the sell price of each packets at 0.18 and total selprice at 67 euros.Also we can see that the worst combination that the company should avoid is the n=400 and k=5 where there the profit is negative so the company will have damage.

Also an interesting thing is to see what is the average package that the buyer should buy to collect all the sticker.

We can see that the highest number of pachages sold to complete the collection that is n=400 and k=5 is not neccecary good because this combination damage the company.

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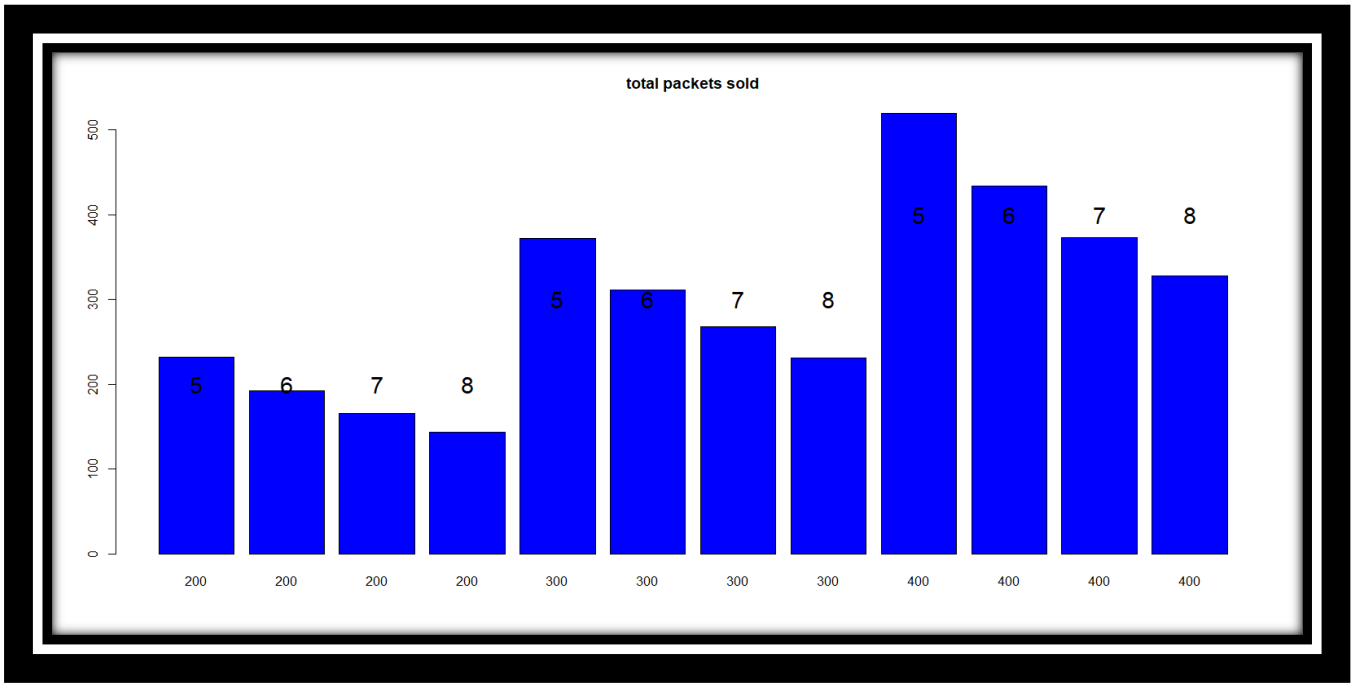


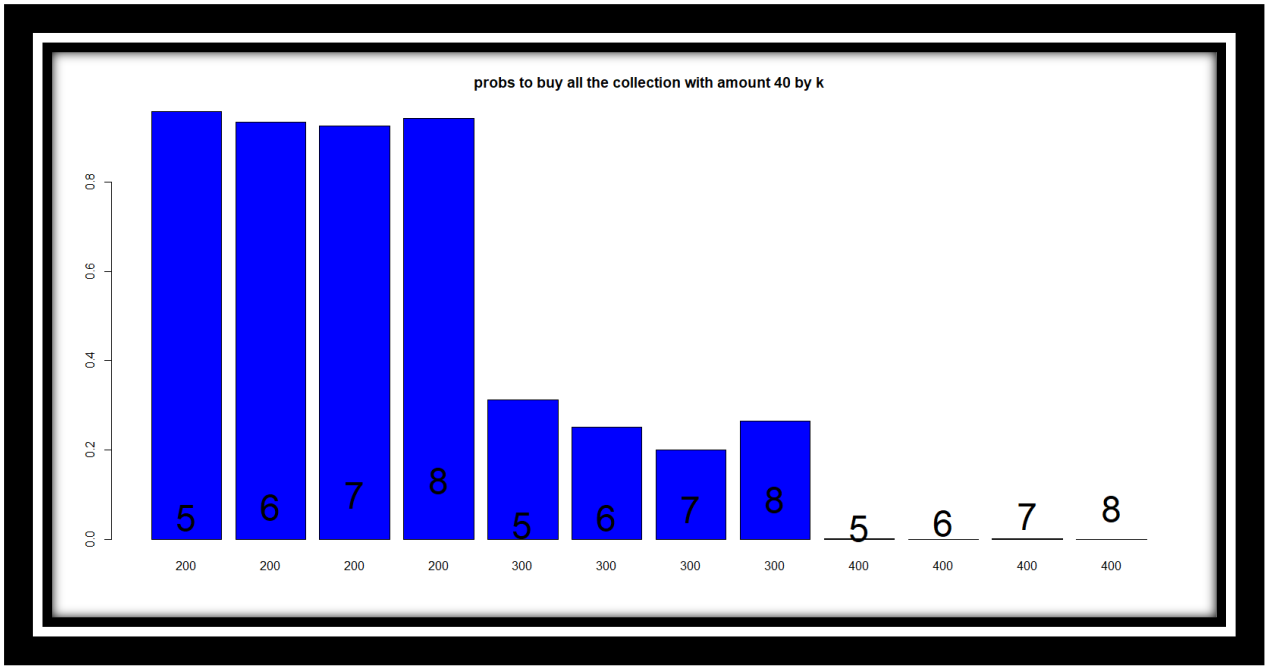
The next question to be answered is if the consumer pays 40 euros, what is the possibility of buying the whole collection with a combined package κ stickers .For this to happen we need to see for each combination of prices if the selling price is less than 40 euros, to calculate the probability.I simulated for 1000 packages for different n and k and calculated the selling price, if the selling price is less than 40 euros then the buyer has completed the collection for the respective n and k

The following table shows thw probability to complete the collection for different v and k.

n	k	prob
200	5	0.95
200	6	0.93
200	7	0.92
200	8	0.94
300	5	0.31
300	6	0.25
300	7	0.20
300	8	0.26
400	5	0.002
400	6	0

400	7	0.001
400	8	0

From the table we can see that the probability to complete the collection is higher for small n and when we increase the n the probability is lower,for different values of k.This result we can show and with the visulaization



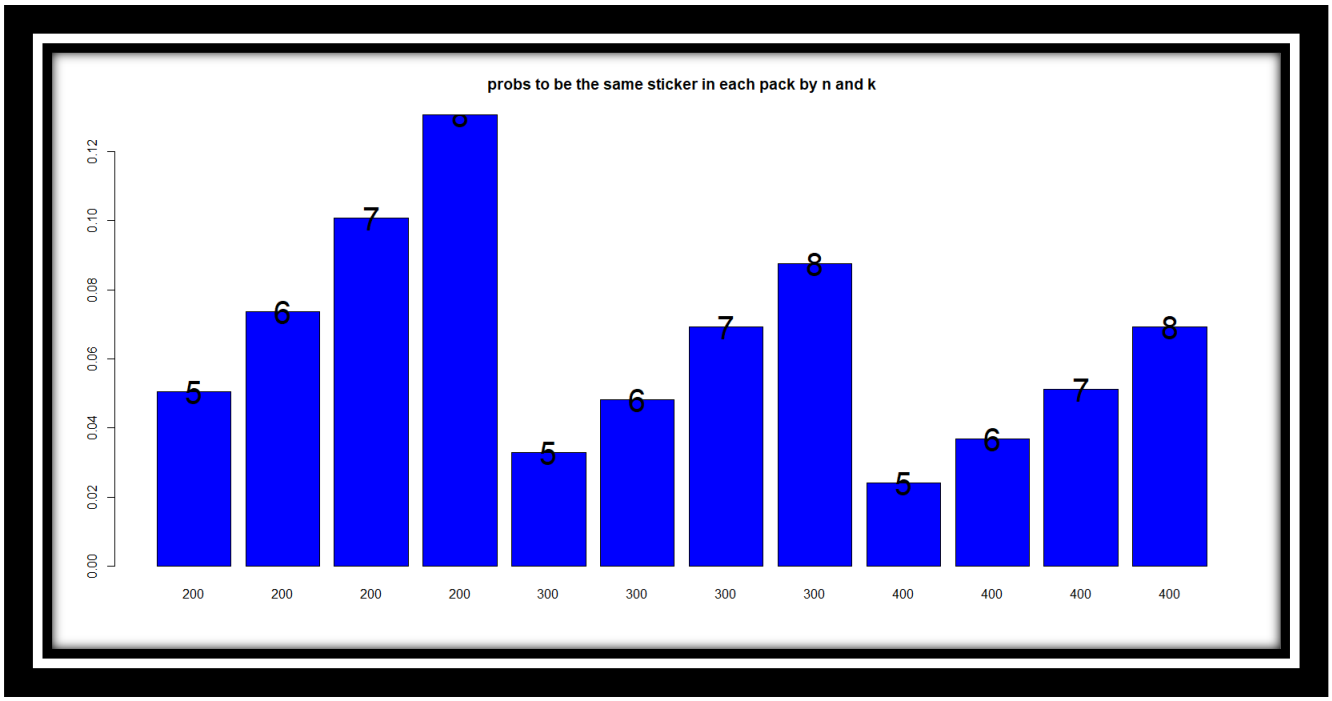
The combination that we are interesting that maximaze the profits is n=400 and k=7 so the probablity to complete the buyer the collection with the amount of 40 euros is almost zero,which is good because the buyer should spend a lot of more money to complete the collection.

The next question to be answered is to check the probability that the consumer has the same sticker in each package he has bought.It is a significant factor that if the probability of finding the same sticker in the that of collection of 400 and the package of 7 is small, then he will keep his consumer interesting what is the next sticker in the package,and they will not get boring because the most times it will be new sticker.

To get this probability i simulate 1000 times for different n nad k to see if the pachage k in the collection n,if the pachage has the same sticker.The result it shows in the following table.

n	k	prob
200	5	0.04
200	6	0.07
200	7	0.1
200	8	0.13
300	5	0.03
300	6	0.04
300	7	0.06
300	8	0.09
400	5	0.02
400	6	0.03
400	7	0.05
400	8	0.06

This table show for different value of n and k the probability one package to have the same sticker,as we can see the combination that we are interesting has very small probability which is very good for the company,one plot will give us to see and understand better the result.



As we can see the higher probability is for n=200 and k=8 and the smallest which is n=400 and k=5,but the combination n=400 and k=7 has also small

probability,also if we get the same sticker it each pachage it dont change anything,because the probability is very small.

The conclusion is .The best combination to maximaze the profits of the company is n=400 and k=7 where the company have profit 3.93 euros,in this combination the probability the buyer will complete the collection whith 40 euros is very small.This is very good for the company because the buyer should spend more money to complete the collection than 40 euros.The last thing is in the combination the pachage k=7 the probability to find the same sticker is very small 0.05 which is good because it will keep the interesting of the buyer to get another stick every time,also it will not change anything if has 2 or more sticker in the same pachage.