Assignment10

a. How many businesses have tot_success of at least two?
What percentage is that of the entire data set? This is the *d* in the Markov model.

```
>my_data<-read.csv("C:/Program Files/R/R-3.3.2/exercises/problem_set-9-Mopps_with_commas.csv",header=TRUE,sep=",",dec=".",fill=TRUE)
> nrow(my_data)
[1] 200
> sum(my_data$tot_success>=2)
[1] 66
```

So there are 66 businesses that have tot_success of at least two, it is 66/200=33% percentage of the entire data set, then d=33%

b. How many businesses have two or more occurrences of non-success (total_nsuccess)?
What percentage is that of the entire data set? This is the f in the Markov model.

```
Ans: > sum(my_data$tot_nsuccess>=2)
[1] 38
```

So there are 38 businesses that have tot_nsuccess of at least two, it is 38/200=19% percentage of the entire data set, then f=19%

Therefore Markov matrix is :

```
Markov_matrix<-matrix(c(0.33,0.67,0.81,0.19), nrow=2, byrow = TRUE)
> Markov_matrix
     [,1] [,2]
[1,] 0.33 0.67
[2,] 0.81 0.19
```

1. **Assuming previous success [1 0], what is the probability of having a successful year?**

```
> Initial_vector<-c(1,0)
> Initial_vector%*%Markov_matrix
     [,1] [,2]
[1,] 0.33 0.67
```

So the probability of have a successful year is 0.33

2. **What is the probability of having two successful years?**

```
> Initial_vector%*%Markov_matrix%*%Markov_matrix
       [,1]   [,2]
[1,] 0.6516 0.3484
```

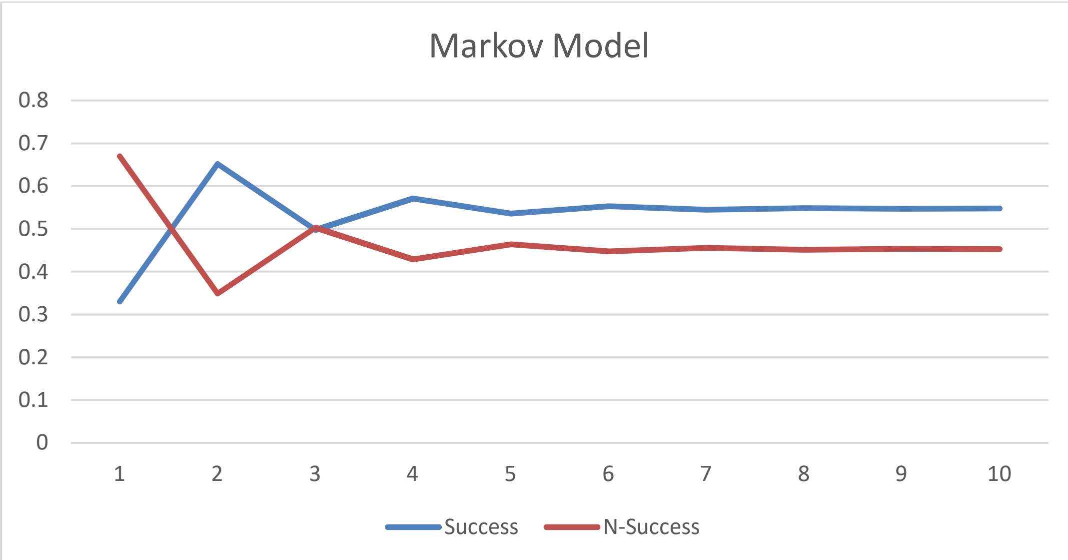
So the probability of have two successful years is 0.6516

3. **Using the strategy outlined in the document "How to Iterate Markov Processes in R," show the table of values for 10 years of success:**

```
>mid_result<-NULL
> for(x in 1:10)
+ {mid_result<-c(mid_result,Init_Vec%*%(trans_max%^%x))}
> mid_mat<-matrix(mid_result,nrow=10,byrow = TRUE)
> mid_mat
          [,1]      [,2]
[1,] 0.3300000 0.6700000
[2,] 0.6516000 0.3484000
[3,] 0.4972320 0.5027680
[4,] 0.5713286 0.4286714
[5,] 0.5357623 0.4642377
[6,] 0.5528341 0.4471659
[7,] 0.5446396 0.4553604
[8,] 0.5485730 0.4514270
[9,] 0.5466850 0.4533150
```

```
[10,] 0.5475912 0.4524088
```

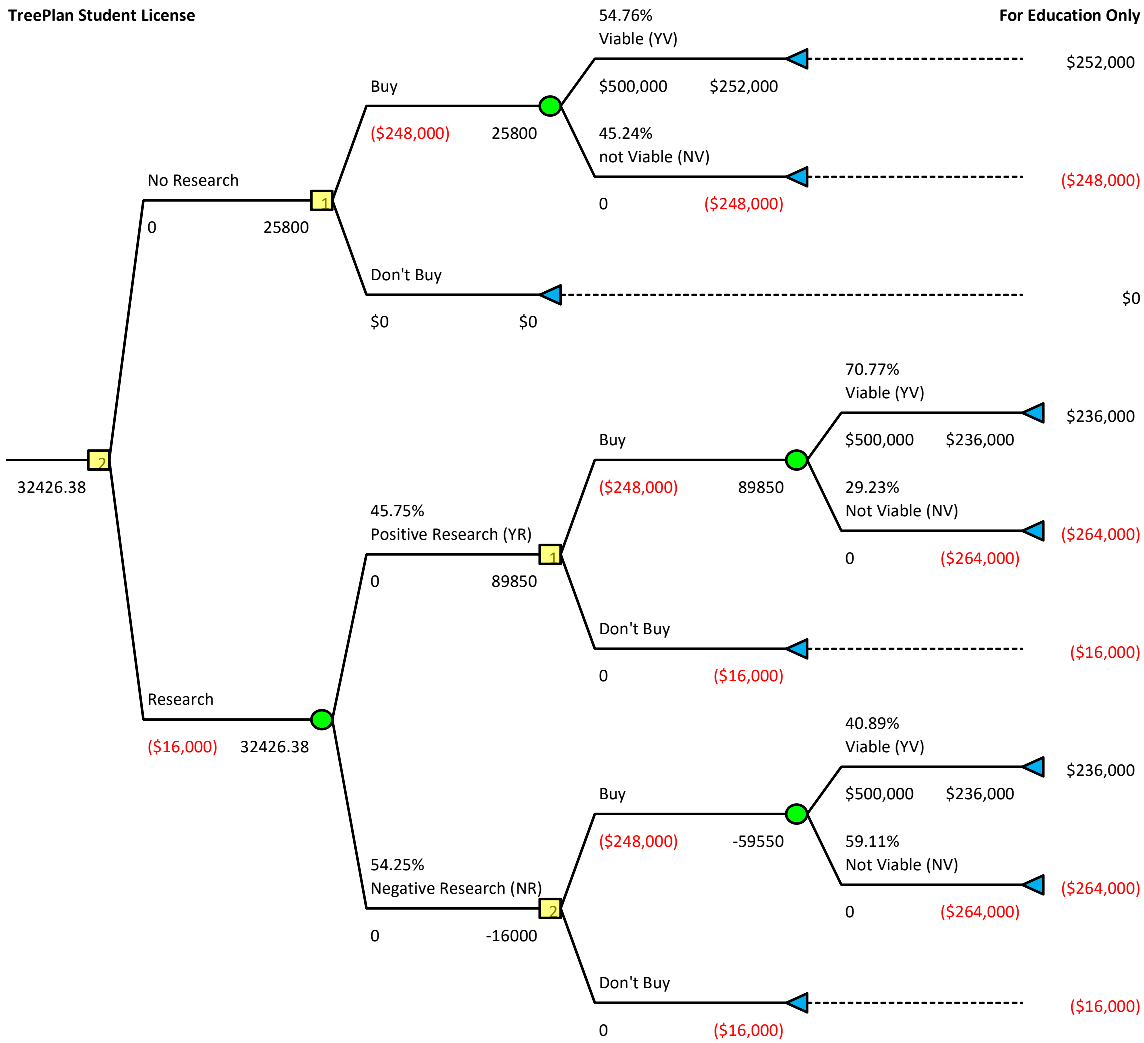
4. **Using the Success and 1-Success matrix output from problem 3, produce a line graph in Excel showing how the probabilities stabilize over time.**



5. **At the end of 10 years, what are values of the blue and red lines? These are your new X% and 1-X% in the Tree Model. These represent the long-term probability of success or non-success, given the starting state of a business.**
   Ans: at the end of 10 years, according to the result table of problem 3, the value of the blue line(success probability) is 0.5475912, the value of the red line(n-success probability) is 0.4524088.

6. **Should you employ Dustin to do the research or not? State the new EVs and explain your decision and what the tree is telling you. Use the new X% and 1-X% in your ProblemSet 10 Tree model in Excel and recalculate the tree.**
   Ans: I still should employ Dustin to do the research. with the new probability of being viable for the business (54.76% vs 52.2%), the expected value of alternative of not doing research increase from 14,500 to 25,800, that is because the business is more likely to be viable and profitable than before, it is less risky to make blind decision; however, the expected value of alternative of doing research also increased from 28040 to 32426, still overdo the alternative of not doing research. With market information available, given the favorable market information the probability that business is going to be viable also increased from 68.85% to 70.77% and given the unfavorable market information, the probability that business will not be successful decreased from 31.15% to 29.23%, so the research result still be very valuable for the business owner to make wise decision: increasing the success probability and reducing the risk.

   The corresponding decision tree is shown as following:


TreePlan Student License
For Education Only
54.76%
Viable (YV)
$500,000
$252,000
$252,000
Buy
($248,000)
25800
45.24%
not Viable (NV)
0
($248,000)
($248,000)
No Research
0
25800
Don't Buy
$0
$0
$0
32426.38
70.77%
Viable (YV)
$500,000
$236,000
$236,000
Buy
($248,000)
89850
29.23%
Not Viable (NV)
0
($264,000)
($264,000)
45.75%
Positive Research (YR)
0
89850
Don't Buy
0
($16,000)
($16,000)
Research
($16,000)
32426.38
40.89%
Viable (YV)
$500,000
$236,000
$236,000
Buy
($248,000)
-59550
59.11%
Not Viable (NV)
0
($264,000)
($264,000)
54.25%
Negative Research (NR)
0
-16000
Don't Buy
0
($16,000)
($16,000)