Assignment for 615 qixuan zhang

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Assignment 1 for 615

Consider the following situation: A sloppy printer produces books with an average of 2 misprints per page. You want to know how many pages have more than k misprints in a book of n pages. Make an n x k table that shows the relationship between the total number of pages in a book and the number of pages with k misprints. Show and explain your work. Include equations and calculations to teach the reader how to solve the problem. Include an image of a book. Push your solution to a github repository and submit the url for repository on blackboard. Be sure your repo includes your document as a pdf file and as an RMD file. Include other files needed to recompile your document.

Solution

Separate this probolem into two steps: The first step is to caculate the number of pages with k misprints by using poisson distribution. The second step is to caculate a book of m pages which contains k misprints by using binomial distribution. The equations of the above distribution: Under this situation, we need Poisson Ditribution,noted $\lambda = 2$ and the equation is:

$$P(X = k) = \frac{\lambda^k}{k!} e^{-\lambda}$$

$$\binom{50}{n} p^n q^{50-n}$$

The result will be displayed in a form of table.

step 1 Calcualte the Poission distribution

```
k <-0:10
probk <- ppois(k,lambda = 2,lower.tail=FALSE)
prob <- matrix(probk,nrow=1,ncol=11)
prob
```

```
##           [,1]      [,2]      [,3]      [,4]       [,5]       [,6]
## [1,] 0.8646647 0.5939942 0.3233236 0.1428765 0.05265302 0.01656361
##             [,7]        [,8]         [,9]        [,10]        [,11]
## [1,] 0.004533806 0.001096719 0.0002374473 4.649808e-05 8.308224e-06
```

step2 Calculate

```
m<- matrix(1:50,nrow=50)
probr <- matrix(rep(0,length(k)*length(m)),nrow=length(m),ncol=length(k))
for(j in 1:length(k)){
```

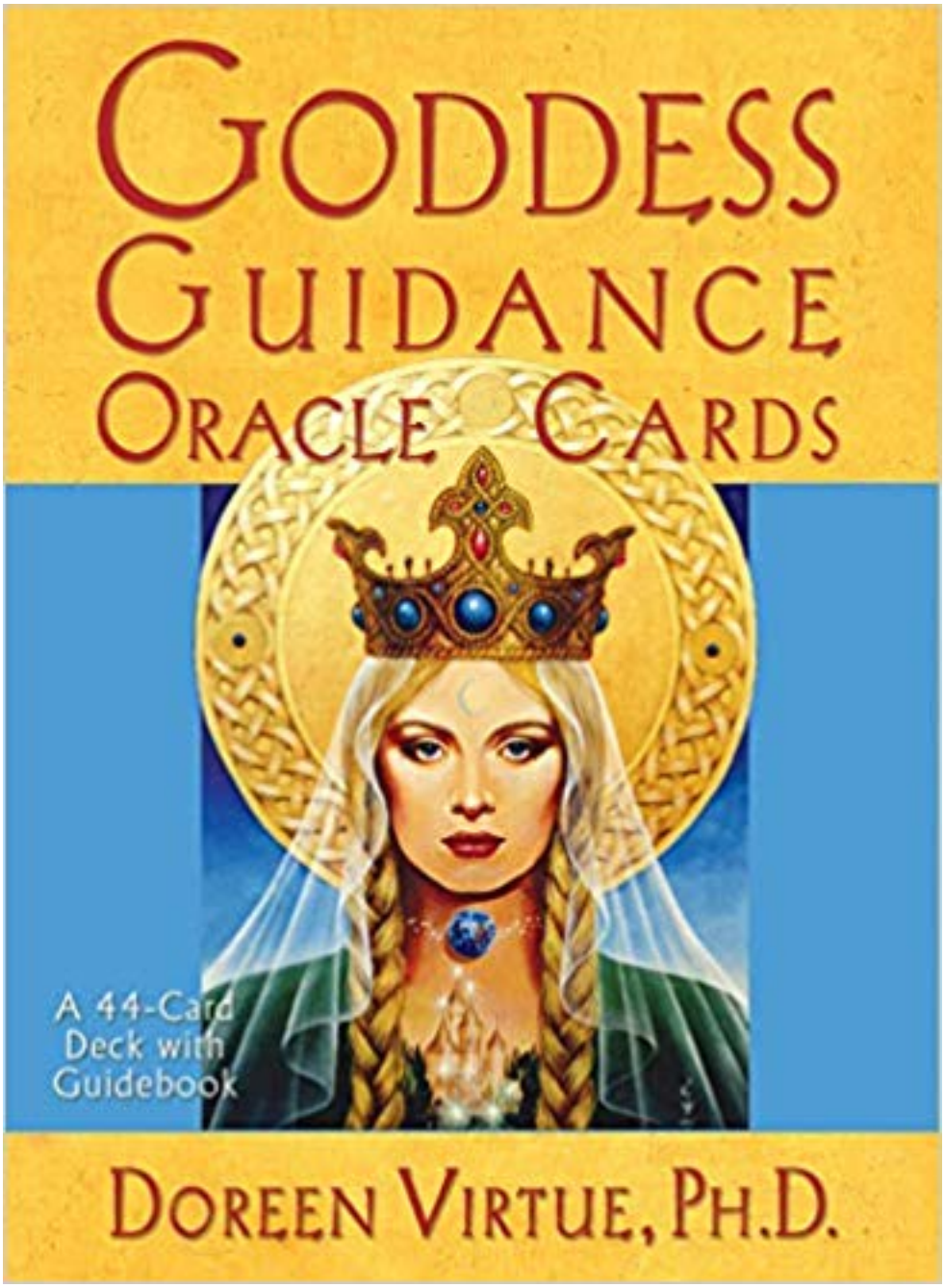
```
  for(i in 1:length(m)){
    probr[i,j]=pbinom(m[i,],size=50,prob[,j])
  }
}

table=as.data.frame(matrix(probr,nrow=length(m),ncol=length(k),dimnames=list(c(1:50),c("k=0","k=1","k=2

knitr::kable(table)
```

k=0	k=1	k=2	k=3	k=4	k=5	k=6	k=7	k=8	k=9
0.0000000	0.0000000	0.0000001	0.0041905	0.2528294	0.7991602	0.9781965	0.9985773	0.9999315	0.9999974
0.0000000	0.0000000	0.0000010	0.0194711	0.5060029	0.9499136	0.9984423	0.9999751	0.9999997	1.0000000
0.0000000	0.0000000	0.0000081	0.0602258	0.7311428	0.9905388	0.9999176	0.9999997	1.0000000	1.0000000
0.0000000	0.0000000	0.0000477	0.1400498	0.8781723	0.9985786	0.9999966	1.0000000	1.0000000	1.0000000
0.0000000	0.0000000	0.0002221	0.2624659	0.9533530	0.9998243	0.9999999	1.0000000	1.0000000	1.0000000
0.0000000	0.0000000	0.0008469	0.4155103	0.9846918	0.9999817	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000000	0.0027233	0.5758679	0.9956402	0.9999984	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000000	0.0075426	0.7195443	0.9989109	0.9999999	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000000	0.0182885	0.8313104	0.9997592	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000000	0.0393399	0.9076959	0.9999525	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000001	0.0759167	0.9539976	0.9999916	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000004	0.1327164	0.9790816	0.9999987	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000017	0.2120473	0.9913039	0.9999998	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000069	0.3122252	0.9966884	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000250	0.4271040	0.9988426	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0000829	0.5471767	0.9996281	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0002524	0.6619208	0.9998899	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0007071	0.7624352	0.9999700	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0018273	0.8433227	0.9999924	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0043677	0.9032285	0.9999982	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0096772	0.9441194	0.9999996	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0199167	0.9698743	0.9999999	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0381540	0.9848555	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.0681706	0.9929084	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.1138421	0.9969101	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.1780904	0.9987486	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000000	0.2616428	0.9995295	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000001	0.3620531	0.9998359	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000007	0.4734962	0.9999470	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000033	0.5876265	0.9999842	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000138	0.6953522	0.9999956	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0000537	0.7889300	0.9999989	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0001928	0.8636060	0.9999997	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0006371	0.9182322	0.9999999	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0019348	0.9547667	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0053895	0.9770378	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0137410	0.9893665	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0319953	0.9955371	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.0678806	0.9983148	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.1309308	0.9994324	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.2291824	0.9998312	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.3636970	0.9999562	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000

k=0	k=1	k=2	k=3	k=4	k=5	k=6	k=7	k=8	k=9
0.5235893	0.9999903	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.6861104	0.9999982	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.8245579	0.9999997	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.9207045	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.9729842	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.9938603	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
0.9993044	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000
1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000	1.0000000

```
#The image of a book
```

```
#install.packages("jpeg")
library(jpeg)
cover_url ='https://github.com/Emma723/MA-615-Assignment/blob/master/book1.jpg'
if (!file.exists(cover_file <- 'book1.jpg'))
  download.file(cover_url, cover_file, mode = 'wb')
knitr::include_graphics(if (identical(knitr:::pandoc_to(), 'html')) cover_url else cover_file)
```


GODDESS
GUIDANCE
ORACLE CARDS
A 44-Card
Deck with
Guidebook
DOREEN VIRTUE, PH.D.