Assignment1

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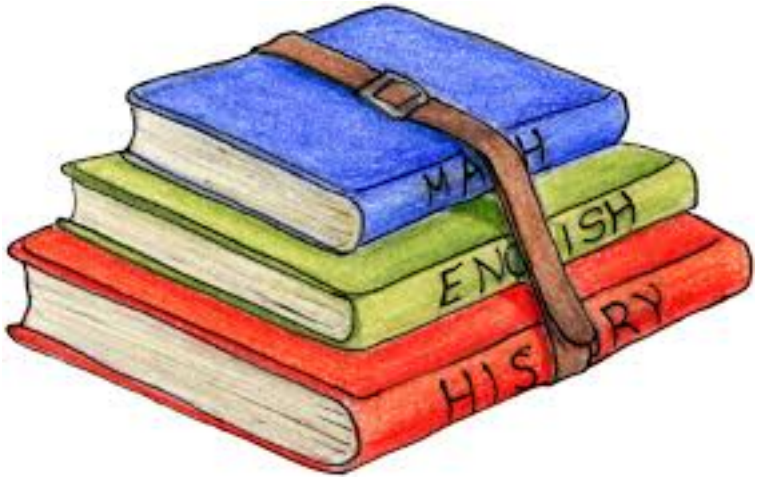
Document assignment

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.

A Image of books

```
cover_url<- 'https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRk-vabmX5h366Xm0R_L3LCMMSOPmRPgGTH8M
if (!file.exists(cover_file <- 'cover.jpg'))
  download.file(cover_url, cover_file, mode = 'wb')
knitr::include_graphics(if (identical(knitr:::pandoc_to(), 'html')) cover_url else cover_file)
```



Solve the problem

We assume the errors on every page is poisson distribution, in which $\lambda = 2$

So $P(errors = k) = \frac{2^k}{k!} * e^{-\lambda}$

When we define a bad page as a page has more than k misprints,the probability of a bad page is $p = \sum_k(P(errors = k + 1))$

The number of bad pages is binomial distribution, in which the parameter p is $p = \sum_k(P(errors = k + 1))$. In this case, the book has 50 pages, so what we need to calculate is $C_{50}^n p^n (1 - p)^{50-n}$

Code

```
library(knitr)
n<-seq(10,50,10)
k<-seq(0,10,1)#The number of errors vary from 0 to 10
colum_n<-vector(mode = "numeric",length = 0)
result<-rep(NULL,5)
for(i in 1:11){
  p<-ppois(k[i],2,lower.tail=FALSE)#The probability of a bad page
  for (j in 1:5){
    colum_n[j]<-dbinom(n[j],50,p)#The probability that there are n[j] pages are bad
  }
  result<-rbind(result,colum_n)
}

result<-as.data.frame(result)
colnames(result)<-c('10pages','20pages','30pages','40pages','50pages')
rownames(result)<-k
kable(result)
```

	10pages	20pages	30pages	40pages	50pages
0	0.0000000	0.0000000	0.0000026	0.0630502	0.0006956
1	0.0000000	0.0025404	0.1141303	0.0011176	0.0000000
2	0.0210515	0.0599058	0.0000372	0.0000000	0.0000000
3	0.0763856	0.0000058	0.0000000	0.0000000	0.0000000
4	0.0001933	0.0000000	0.0000000	0.0000000	0.0000000
5	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
6	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
7	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
8	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
10	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000