

# 615 assignment

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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.

For this problem, n=50, so we set the sequence from 5 to 50 by 5 and I set K from 0 to 5.

From this problem requirement, we can get that this problem follow the Possion distribution. Possion(lamda), and the lamda=2,

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

```
page_N=seq(5,50,5)
misK=c(0,1,2,3,4,5)
prob_mis=ppois(q = misK, lambda = 2, lower.tail = F)
prob_mis
```

```
## [1] 0.86466472 0.59399415 0.32332358 0.14287654 0.05265302 0.01656361
```

when I figure out the Possion distribution, next I will use the binomial distribution

$$\left( P(A) = \sum_k P(\{e_1, \dots, e_N\}) = N \right)$$

```
prob_page=pbinom(q = page_N, size = 50, prob = prob_mis, lower.tail = T)
prob_page
```

```
## [1] 8.535741e-34 1.472328e-08 4.271040e-01 9.999982e-01 1.000000e+00
## [6] 1.000000e+00 1.934814e-03 9.994324e-01 1.000000e+00 1.000000e+00
```

```
Table=data.frame(matrix(ncol=6, nrow =10, dimname = list(c("page5","page10","page15","page20",
"page50"), c("misprint0","misprint1","misprint2",
"misprint3","misprint4","misprint5"))))
for(i in 1:10){
  Table[i, ]=pbinom(5*i, 50, prob=prob_mis, lower.tail = F)
}
kable(Table)
```

	misprint0	misprint1	misprint2	misprint3	misprint4	misprint5
page5	1.0000000	1.0000000	0.9997779	0.7375341	0.0466470	0.0001757
page10	1.0000000	1.0000000	0.9606601	0.0923041	0.0000475	0.0000000
page15	1.0000000	0.9999750	0.5728960	0.0011574	0.0000000	0.0000000
page20	1.0000000	0.9956323	0.0967715	0.0000018	0.0000000	0.0000000
page25	1.0000000	0.8861579	0.0030899	0.0000000	0.0000000	0.0000000

	misprint0	misprint1	misprint2	misprint3	misprint4	misprint5
page30	0.9999967	0.4123735	0.0000158	0.0000000	0.0000000	0.0000000
page35	0.9980652	0.0452333	0.0000000	0.0000000	0.0000000	0.0000000
page40	0.8690692	0.0005676	0.0000000	0.0000000	0.0000000	0.0000000
page45	0.1754421	0.0000003	0.0000000	0.0000000	0.0000000	0.0000000
page50	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

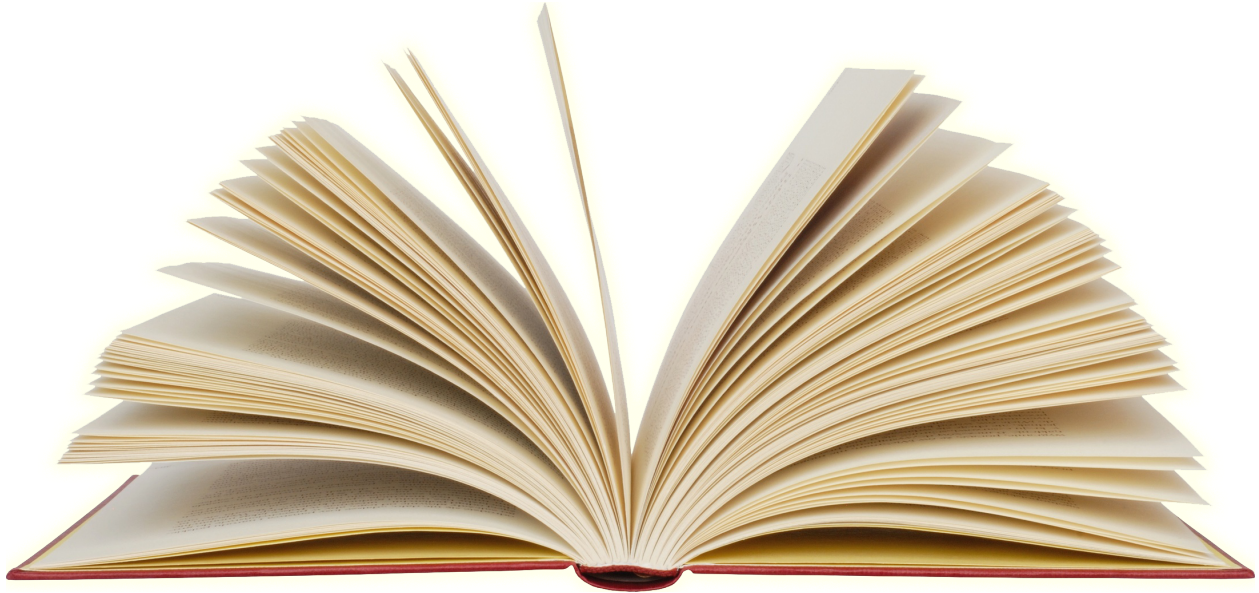


Figure 1: <https://goo.gl/images/aMc1H4>