

# Assignment\_1

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1. Calculate  $p_k$ . Since the number of misprints in one page follows a  $Poisson(\lambda = 2)$  distribution, so that we can come out with a table `p_k` contains the probability of one single page with at least 0 to 10 misprints.

```
p_k = c(ppois(q=0:10,lambda=2,lower.tail=FALSE))
p_k

## [1] 8.646647e-01 5.939942e-01 3.233236e-01 1.428765e-01 5.265302e-02
## [6] 1.656361e-02 4.533806e-03 1.096719e-03 2.374473e-04 4.649808e-05
## [11] 8.308224e-06
```

2. Build a table with 51 rows (number of pages) and 11 columns (number of misprints). Next, since no more than  $n$  pages with more than  $k$  misprints follows a Binomial distribution, we calculate each element in table with `pbinom( $n$ , 50,  $p_k$ )`.

```
table = as.data.frame(matrix(nrow=51,ncol=11,dimnames=list(c(0:50),c(0:10))))
for (i in 1:51) {
  for (j in 1:11) {
    table[i,j] = pbinom(q=i-1,size=50,prob=p_k[j])
  }
}
table
```

##	0	1	2	3	4
## 0	3.720076e-44	2.670635e-20	3.304091e-09	0.0004489202	0.06690427
## 1	1.192109e-41	1.980301e-18	8.224068e-08	0.0041905142	0.25282936
## 2	1.872128e-39	7.200486e-17	1.006302e-06	0.0194711101	0.50600287
## 3	1.920316e-37	1.711161e-15	8.070732e-06	0.0602258208	0.73114276
## 4	1.446757e-35	2.988902e-14	4.773243e-05	0.1400497721	0.87817227
## 5	8.535741e-34	4.091566e-13	2.220798e-04	0.2624658862	0.95335299
## 6	4.106181e-32	4.570723e-12	8.468685e-04	0.4155102686	0.98469177
## 7	1.655816e-30	4.284098e-11	2.723349e-03	0.5758678770	0.99564017
## 8	5.710837e-29	3.437878e-10	7.542593e-03	0.7195443239	0.99891089
## 9	1.710459e-27	2.398478e-09	1.828847e-02	0.8313103735	0.99975922
## 10	4.502020e-26	1.472328e-08	3.933993e-02	0.9076959390	0.99995253
## 11	1.051232e-24	8.029209e-08	7.591675e-02	0.9539975546	0.99999160
## 12	2.194466e-23	3.920594e-07	1.327164e-01	0.9790815693	0.99999866
## 13	4.121441e-22	1.725337e-06	2.120473e-01	0.9913039225	0.99999981
## 14	7.000803e-21	6.880521e-06	3.122252e-01	0.9966884309	0.99999997
## 15	1.080295e-19	2.498164e-05	4.271040e-01	0.9988425755	1.00000000
## 16	1.520013e-18	8.291160e-05	5.471767e-01	0.9996280651	1.00000000
## 17	1.956250e-17	2.524168e-04	6.619208e-01	0.9998899364	1.00000000
## 18	2.308990e-16	7.070640e-04	7.624352e-01	0.9999699654	1.00000000
## 19	2.504989e-15	1.827329e-03	8.433227e-01	0.9999924332	1.00000000

```

## 20 2.502538e-14 4.367730e-03 9.032285e-01 0.9999982383 1.00000000
## 21 2.305741e-13 9.677236e-03 9.441194e-01 0.9999996207 1.00000000
## 22 1.961692e-12 1.991675e-02 9.698743e-01 0.9999999244 1.00000000
## 23 1.542630e-11 3.815400e-02 9.848555e-01 0.9999999861 1.00000000
## 24 1.122057e-10 6.817062e-02 9.929084e-01 0.9999999976 1.00000000
## 25 7.552677e-10 1.138421e-01 9.969101e-01 0.9999999996 1.00000000
## 26 4.705806e-09 1.780904e-01 9.987486e-01 0.9999999999 1.00000000
## 27 2.714155e-08 2.616428e-01 9.995295e-01 1.0000000000 1.00000000
## 28 1.448877e-07 3.620531e-01 9.998359e-01 1.0000000000 1.00000000
## 29 7.155883e-07 4.734962e-01 9.999470e-01 1.0000000000 1.00000000
## 30 3.267955e-06 5.876265e-01 9.999842e-01 1.0000000000 1.00000000
## 31 1.378874e-05 6.953522e-01 9.999956e-01 1.0000000000 1.00000000
## 32 5.369935e-05 7.889300e-01 9.999989e-01 1.0000000000 1.00000000
## 33 1.927854e-04 8.636060e-01 9.999997e-01 1.0000000000 1.00000000
## 34 6.370998e-04 9.182322e-01 9.999999e-01 1.0000000000 1.00000000
## 35 1.934814e-03 9.547667e-01 1.000000e+00 1.0000000000 1.00000000
## 36 5.389467e-03 9.770378e-01 1.000000e+00 1.0000000000 1.00000000
## 37 1.374102e-02 9.893665e-01 1.000000e+00 1.0000000000 1.00000000
## 38 3.199527e-02 9.955371e-01 1.000000e+00 1.0000000000 1.00000000
## 39 6.788062e-02 9.983148e-01 1.000000e+00 1.0000000000 1.00000000
## 40 1.309308e-01 9.994324e-01 1.000000e+00 1.0000000000 1.00000000
## 41 2.291824e-01 9.998312e-01 1.000000e+00 1.0000000000 1.00000000
## 42 3.636970e-01 9.999562e-01 1.000000e+00 1.0000000000 1.00000000
## 43 5.235893e-01 9.999903e-01 1.000000e+00 1.0000000000 1.00000000
## 44 6.861104e-01 9.999982e-01 1.000000e+00 1.0000000000 1.00000000
## 45 8.245579e-01 9.999997e-01 1.000000e+00 1.0000000000 1.00000000
## 46 9.207045e-01 1.000000e+00 1.000000e+00 1.0000000000 1.00000000
## 47 9.729842e-01 1.000000e+00 1.000000e+00 1.0000000000 1.00000000
## 48 9.938603e-01 1.000000e+00 1.000000e+00 1.0000000000 1.00000000
## 49 9.993044e-01 1.000000e+00 1.000000e+00 1.0000000000 1.00000000
## 50 1.000000e+00 1.000000e+00 1.000000e+00 1.0000000000 1.00000000
##      5      6      7      8      9      10
## 0 0.4338242 0.7967569 0.9466119 0.9881964 0.9976777 0.9995847
## 1 0.7991602 0.9781965 0.9985773 0.9999315 0.9999974 0.9999999
## 2 0.9499136 0.9984423 0.9999751 0.9999997 1.0000000 1.0000000
## 3 0.9905388 0.9999176 0.9999997 1.0000000 1.0000000 1.0000000
## 4 0.9985786 0.9999966 1.0000000 1.0000000 1.0000000 1.0000000
## 5 0.9998243 0.9999999 1.0000000 1.0000000 1.0000000 1.0000000
## 6 0.9999817 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 7 0.9999984 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 8 0.9999999 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 9 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 10 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 11 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 12 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 13 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 14 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 15 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 16 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 17 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 18 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 19 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 20 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 21 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000

```

3

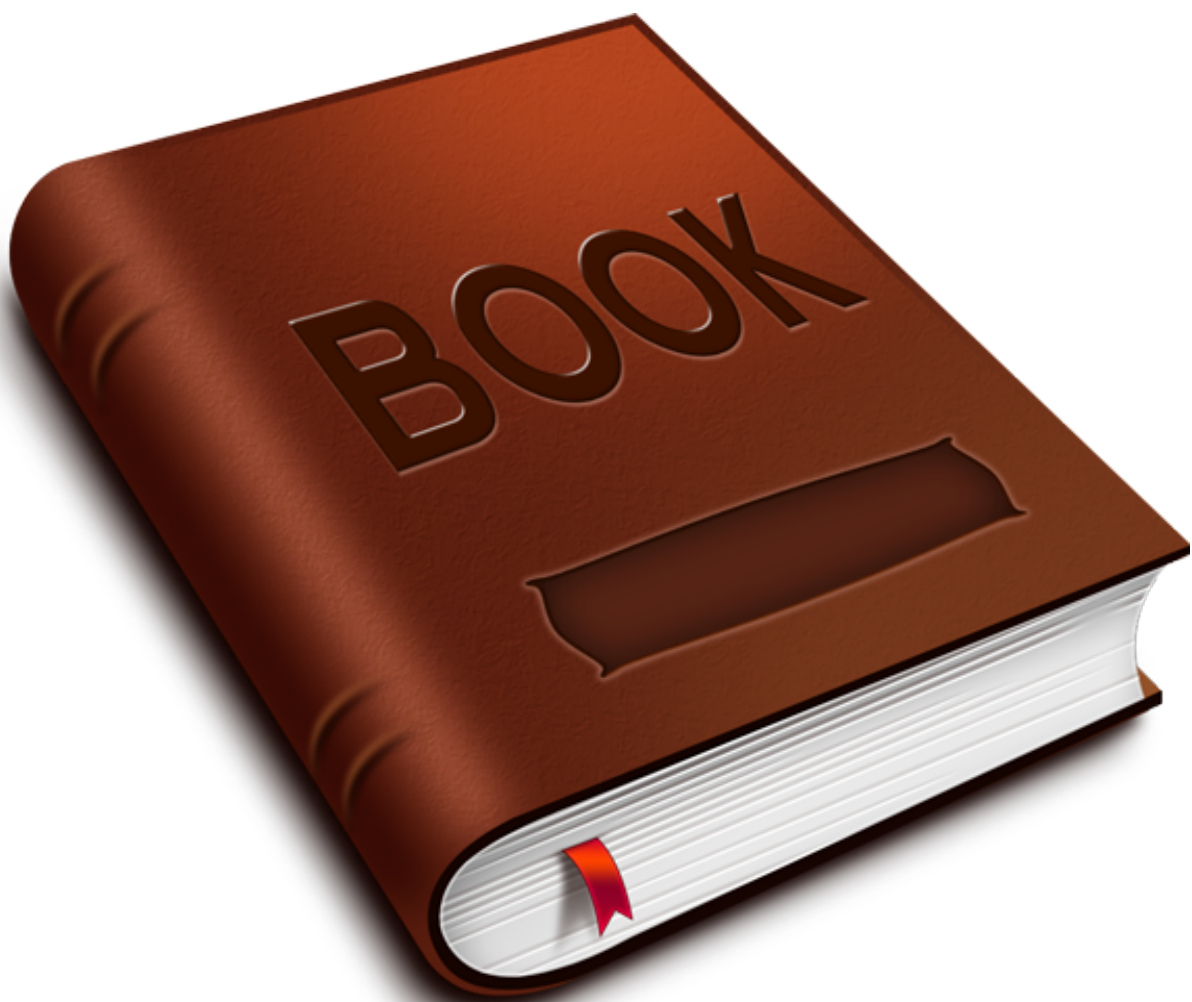


Figure 1: Book Image