Assignment_1

Xinyi Wang

9/16/2018

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 lesat 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).

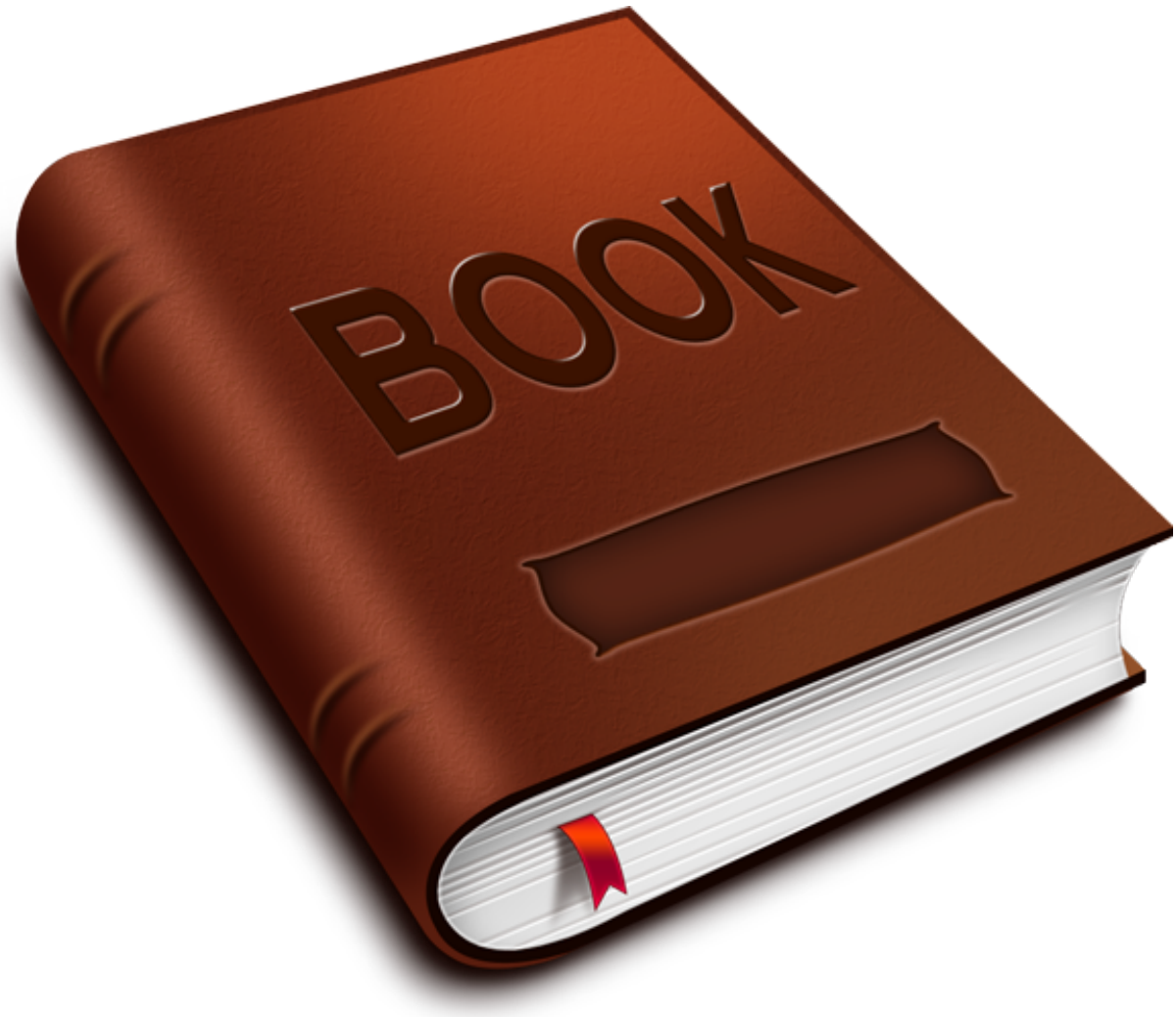
```
table = as.data.frame(matrix(nrow=51,ncol=11,dimnames=list(c(0:50),c(0:10))))
for (i in 1:51) {
  for (j in 1:11) {
    table[i,j] = pbinom(q=i-1,size=50,prob=p_k[j])
  }
}
table
```

```
##               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
```

```
## 22 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 23 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 24 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 25 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 26 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 27 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 28 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 29 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 30 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 31 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 32 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 33 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 34 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 35 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 36 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 37 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 38 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 39 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 40 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 41 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 42 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 43 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 44 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 45 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 46 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 47 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 48 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 49 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
## 50 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000 1.0000000
```

```
download.file(url = "https://rta.org.af/eng/wp-content/uploads/2016/02/book.png",
          destfile = "book.png",
          mode = 'wb')
knitr::include_graphics(path = "book.png")
```


BOOK