機統 HW5

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No.
Date

5.14

let X : number of game Bull win X = 0~7 (X∈N)

(a) n=4 p(X=4) = 1 - 0.3439 = 0.6561

(b) $0.6561 + \binom{4}{3}(0.9)^4(0.1) + \binom{5}{3}(0.9)^4(0.1)^2 + \binom{6}{3}(0.9)^4(0.1)^3$

= 0.9973

(c) the probability that Bull win is fixed.

5.26 let X : number of automobile accident due to mainly to speed violation X = 0~8 (X∈N)

(a) $b(6,8,0.6) = \binom{8}{6}(0.6)^6(0.4)^2 = 0.209$

(b) $b(6,8,0.6) = \sum_{x=0}^{6} b(x,8,0.6) - \sum_{x=0}^{5} b(x,8,0.6)$

$= 0.8936 - 0.6846 = 0.209$

5.50

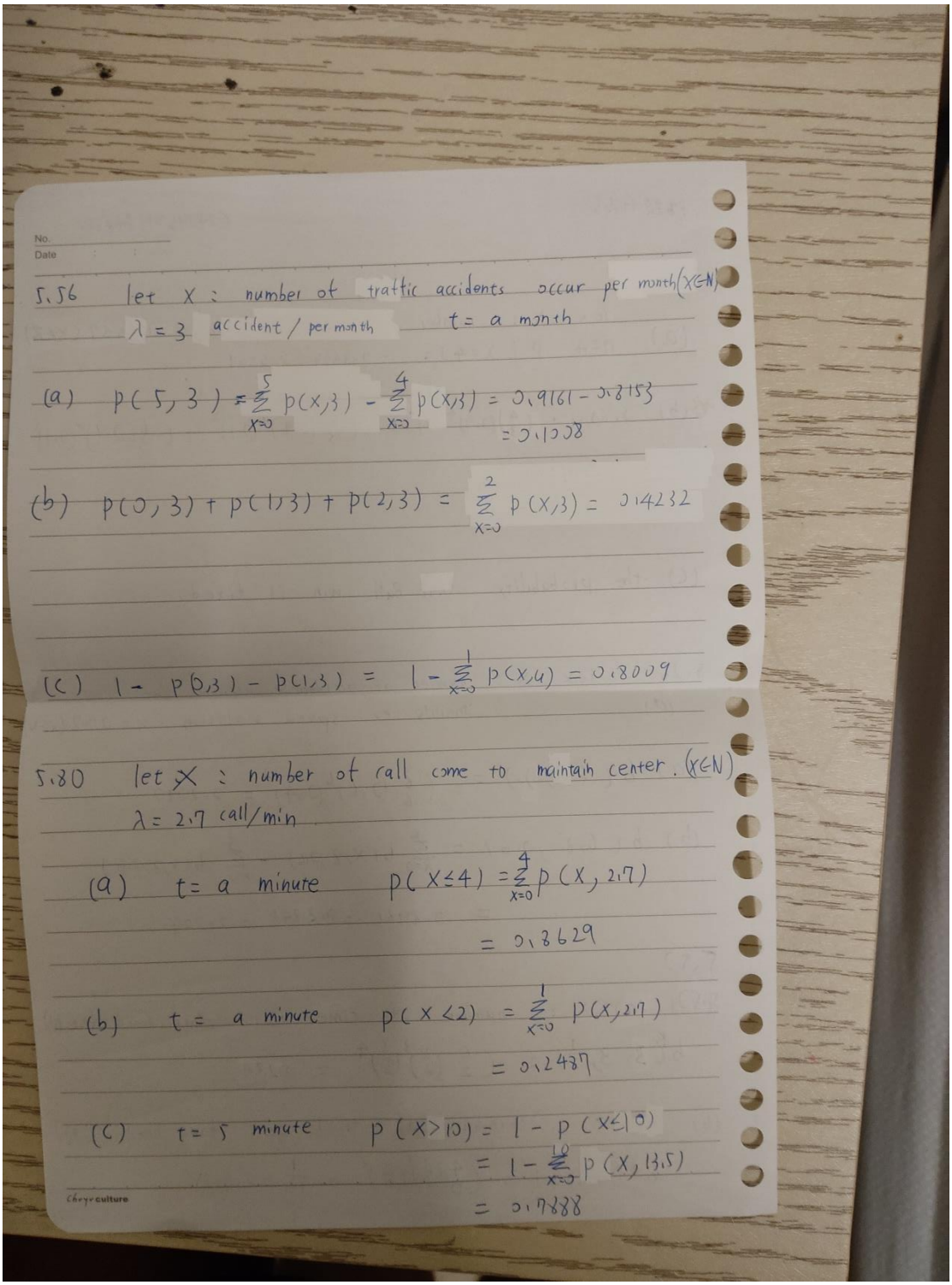
(a) let X : number of trial get third head (X∈N)

$b^*(7,3,\frac{1}{2}) = \binom{6}{2}(\frac{1}{2})^3(\frac{1}{2})^4 = 0.117$

(b) let X : number of trial get first head (X∈N)

$b^*(4,1,\frac{1}{2}) = \binom{3}{0}(\frac{1}{2})^1(\frac{1}{2})^3 = \frac{1}{16} = 0.0625$

Chuyo culture



5.56 let X : number of traffic accidents occur per month ($X \in N$)

$\lambda = 3$ accident / per month t = a month

(a) $P(5,3) = \sum_{x=0}^{5} p(x,3) - \sum_{x=0}^{4} p(x,3) = 0.9161 - 0.8153$

$= 0.1008$

(b) $p(0,3) + p(1,3) + p(2,3) = \sum_{x=0}^{2} p(x,3) = 0.4232$

(c) $1 - p(0,3) - p(1,3) = 1 - \sum_{x=0}^{1} p(x,4) = 0.8009$

5.80 let X : number of call come to maintain center. ($X \in N$)

$\lambda = 2.7$ call/min

(a) t = a minute $P(X \le 4) = \sum_{x=0}^{4} p(x, 2.7)$

$= 0.8629$

(b) t = a minute $P(X < 2) = \sum_{x=0}^{1} p(x, 2.7)$

$= 0.2487$

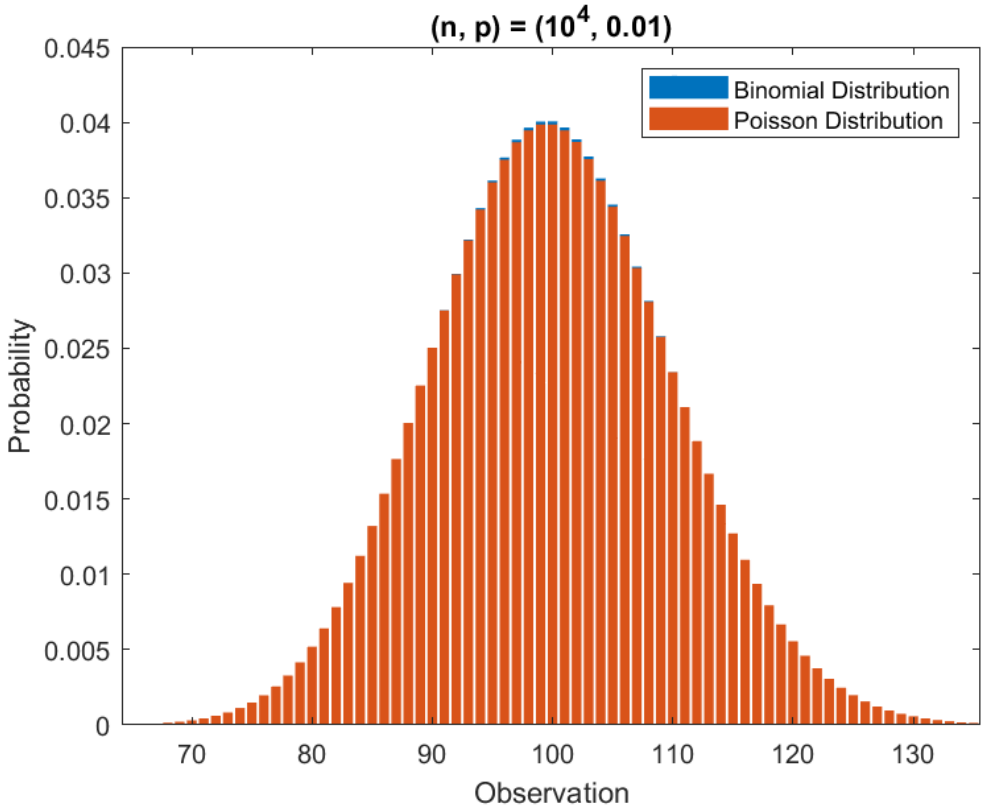
(c) t = 5 minute $P(X > 10) = 1 - P(X \le 10)$

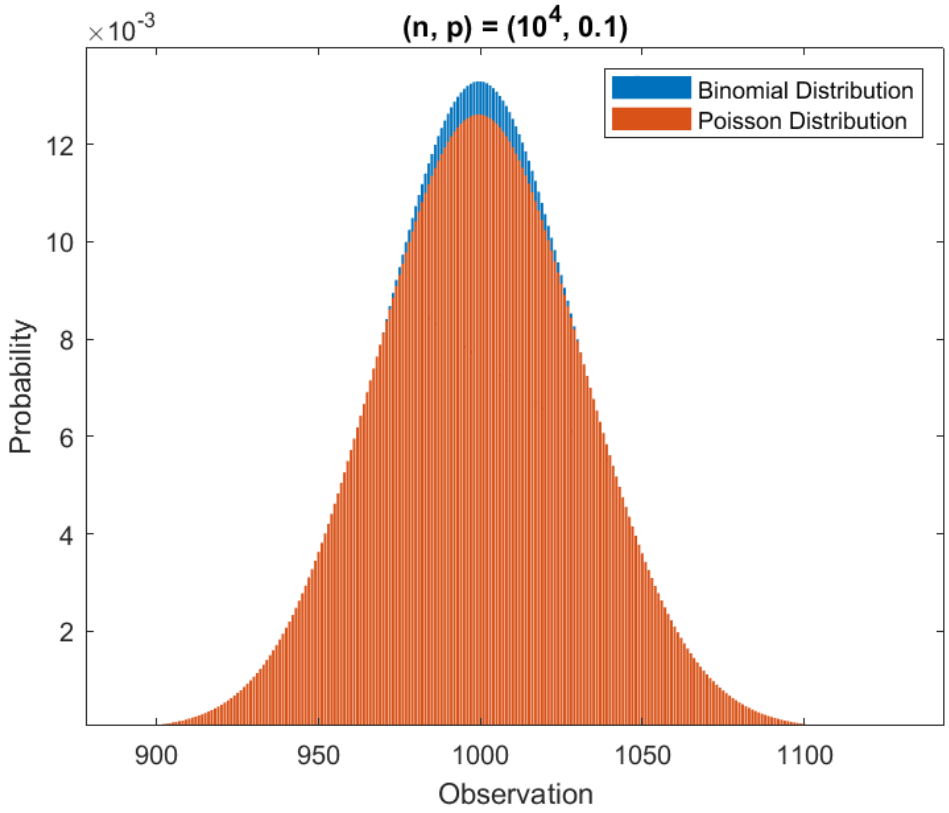
$= 1 - \sum_{x=0}^{10} p(x, 13.5)$

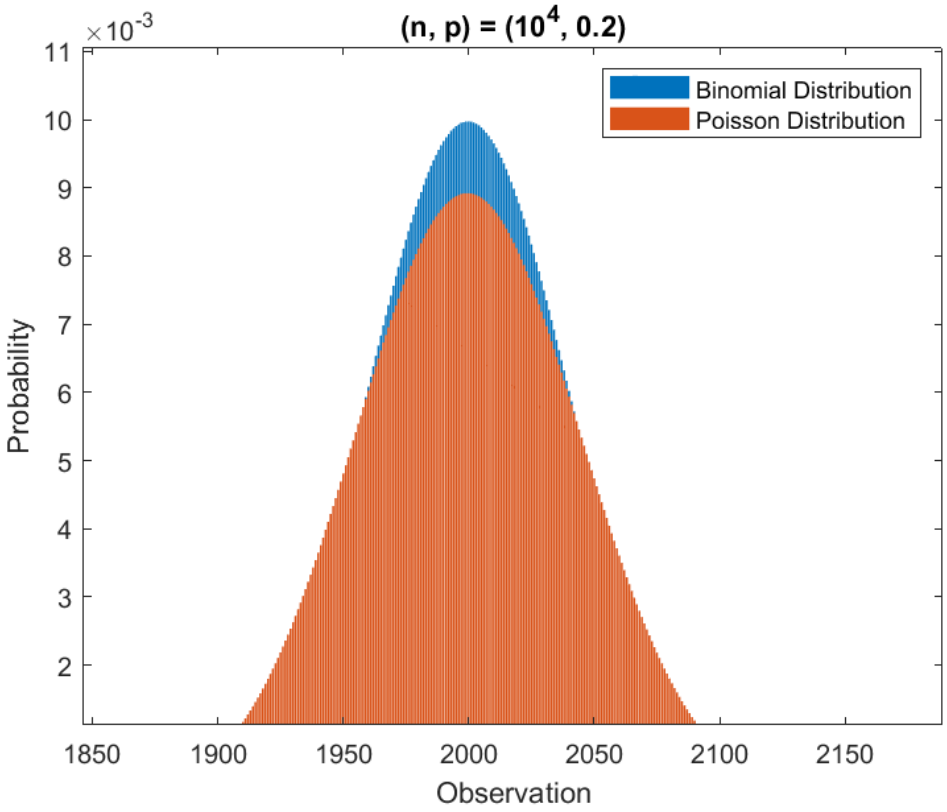
$= 0.7888$

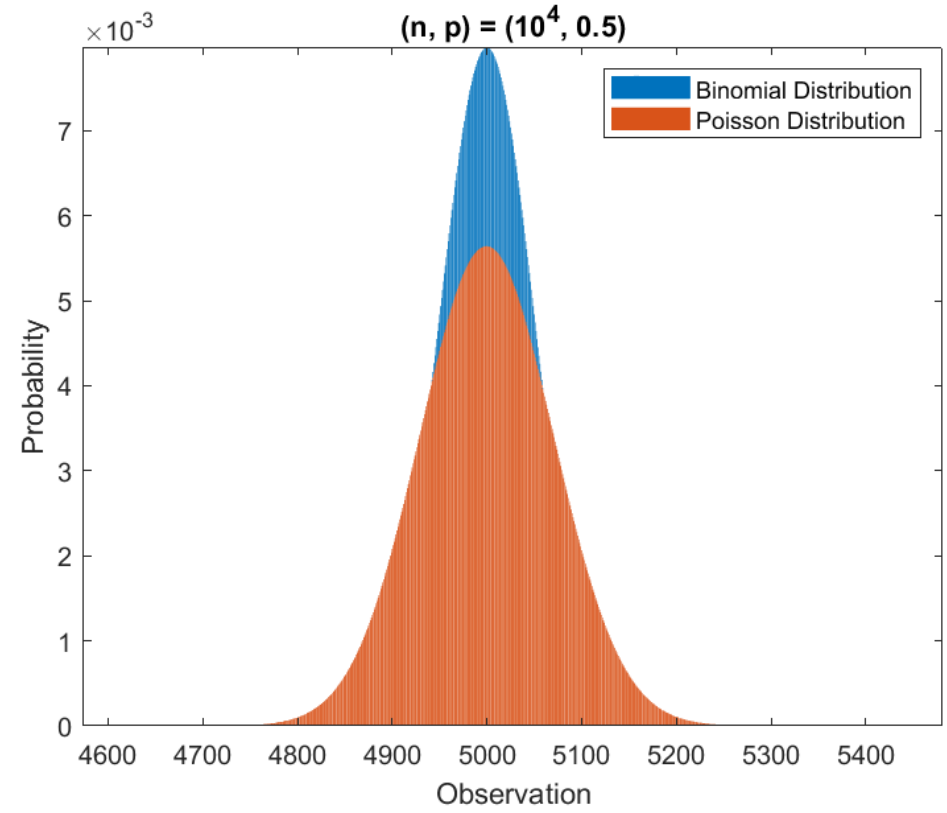
Matlab

1(e)


(n, p) = (10^4, 0.01)
Binomial Distribution
Poisson Distribution
Probability
Observation
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
70
80
90
100
110
120
130


(n, p) = (10^4, 0.1)
×10^-3
Binomial Distribution
Poisson Distribution
Probability
Observation
12
10
8
6
4
2
900
950
1000
1050
1100

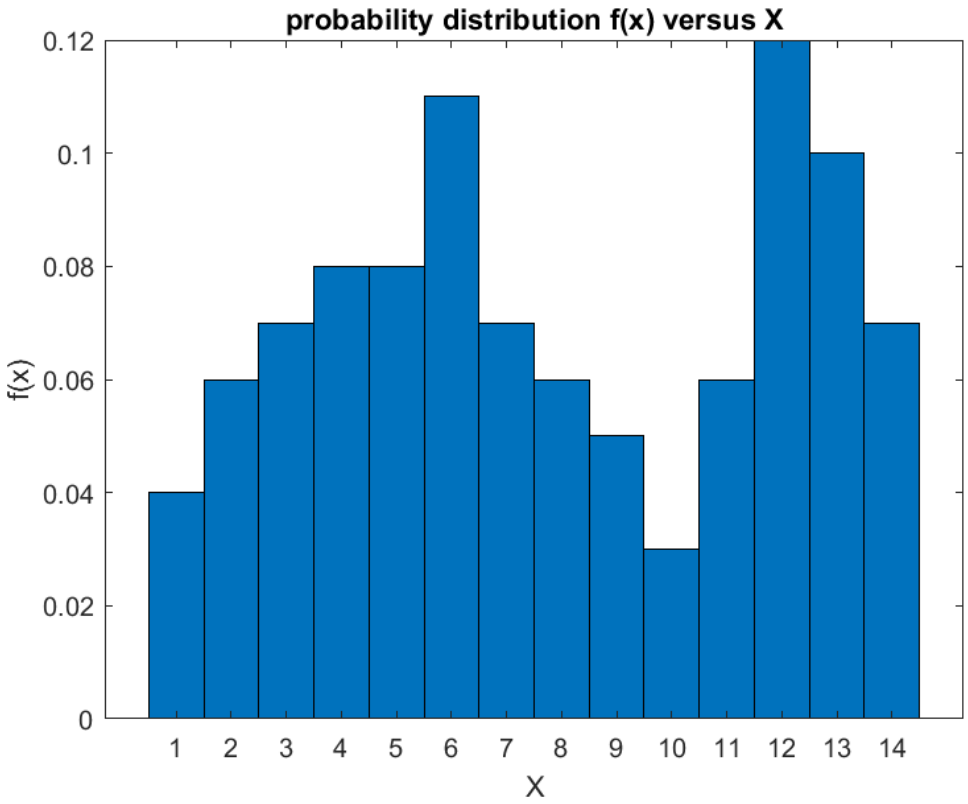




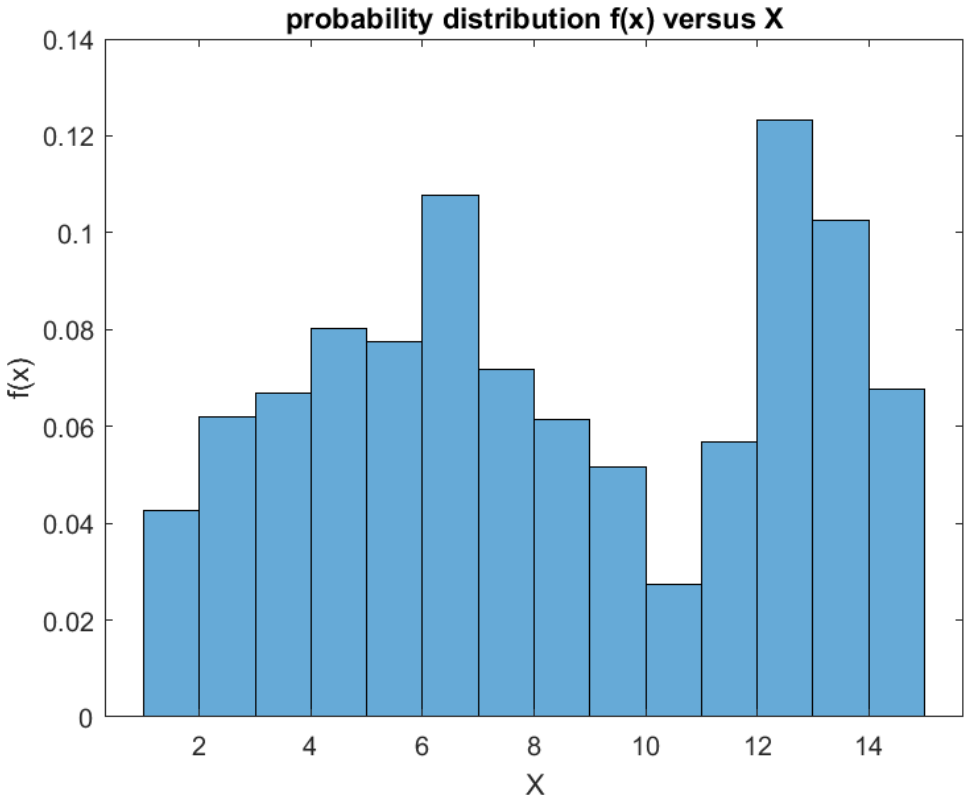
四張圖中 n 都是一樣的，不難看出隨著 p 的增大，實際的 binomial distribution

與 poisson distribution 的誤差就越大，這也反映了課本上提到的，需要 p 趨近 0 或 1-p 趨近 0 時用 poisson distribution 去估計 binomial distribution 才能有比較好的效果。

2(a)



2(b)



2(b)產生的圖可以看出利用 bfun 產生出來的結果大致和 X 的 probability distribution(2(a)的圖)是相似的,因為 X 是由均勻亂數隨機產生再分類的,所以這樣的結果是合理的。