資訊113 F74094075 張庭菀 機統Mid

1、

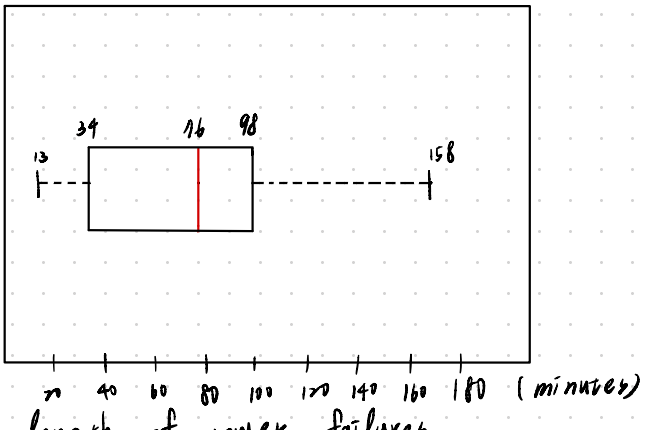
①

Stem and leaf plot of the lengths of power failures

Stem	Leaf	Frequency
1	3, 5, 8	3
2	1, 2, 2, 4, 8, 8	6
3		0
4	0, 7	2
5	0, 5	2
6	6, 9	2
7	0, 4, 4, 8, 8	5
8	3, 3, 7, 9	4
9	0, 6, 8, 8	4
10	3, 6	2
11	5, 8	2
12	1	1
13	2, 5	2
14		0
15	8	1

②

box and whisker plot of the lengths of power failures



length of power failures

2.

① 0.04 0.0105 0.005

$P(d) = 0.02 \times 0.4 + 0.35 \times 0.03 + 0.25 \times 0.02 = 0.0235$

produced by A: $\frac{P(d) \cap P(A)}{P(d)} = \frac{0.08}{0.0235} \approx 0.34$ #

produced by B = $\frac{0.0105}{0.0235} \approx 0.45$ #

produced by C = $\frac{0.005}{0.0235} \approx 0.21$ #

② $f(x) = C_x^n \, 0.0235^x \cdot 0.9765^{(n-x)}$, for $x \in Z$, $0 \le x \le n$

3.

① Z=0

Y\X	0	1	2	3
0	0	0	0	$\frac{1}{12}$
1	0	0	$\frac{1}{4}$	0
2	0	$\frac{1}{8}$	0	0
3	$\frac{1}{120}$	0	0	0

Z=1

Y\X	0	1	2	3
0	0	0	$\frac{1}{6}$	0
1	0	$\frac{1}{4}$	0	0
2	$\frac{1}{20}$	0	0	0
3	0	0	0	0

Z=2

Y\X	0	1	2	3
0	0	$\frac{1}{24}$	0	0
1	$\frac{1}{40}$	0	0	0
2	0	0	0	0
3	0	0	0	0

② $X=1$

X+Y \ Z	0	1	2	3
0	0	0	0	0
1	0	0	$\frac{1}{10}$	0
2	0	$\frac{2}{5}$	0	0
3	$\frac{2}{10}$	0	0	0

4.

$P(X>10) = 1 - P(X<10) = 1 - \sum_{x=0}^{9} b(x, 14, 0.4) = 1 - 0.9825 = 0.0175$

我認為此推測不合理，

因為用40%去算，得到有10個以上的不良品機率只有0.0175 (<0.05)，是rare event，然而40%並不低，所以"defective rate >0.4"不合理

5

① (圖在下一頁)

由此實驗可以得知，當p越接近0.5時，機率分佈圖的偏移程度會越小

當 $p=0.5$ 時，不會發生偏移

然而，當p越大，skew to left 的程度越大 ($p=0.7, 0.9$)

反之，當p越小，skew to right 的程度越大 ($p=0.1, 0.3$)

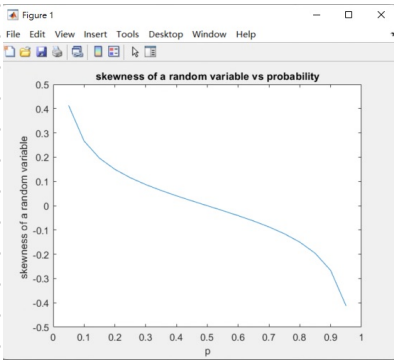


Figure 1
File Edit View Insert Tools Desktop Window Help
skewness of a random variable vs probability
skewness of a random variable
p

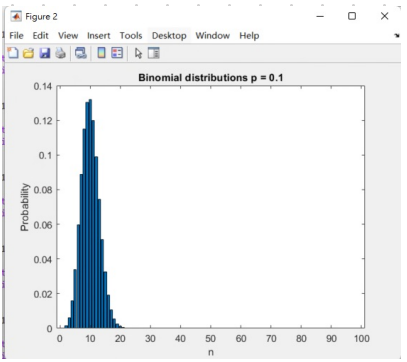


Figure 2
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Binomial distributions p = 0.1
Probability
n

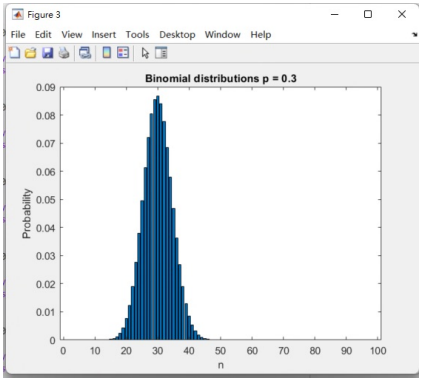
Figure 3
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Binomial distributions p = 0.3
Probability
n

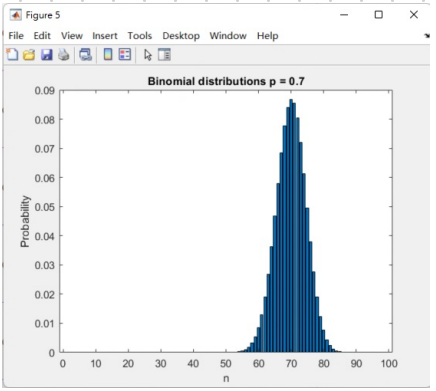
Figure 5
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Binomial distributions p = 0.7
Probability
n

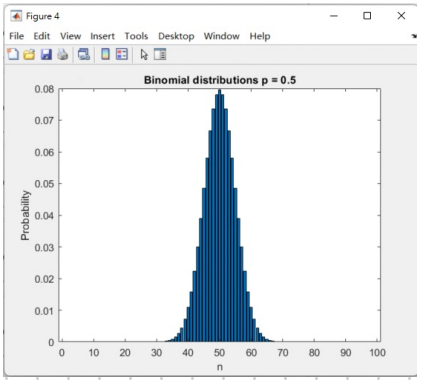
Figure 4
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Binomial distributions p = 0.5
Probability
n

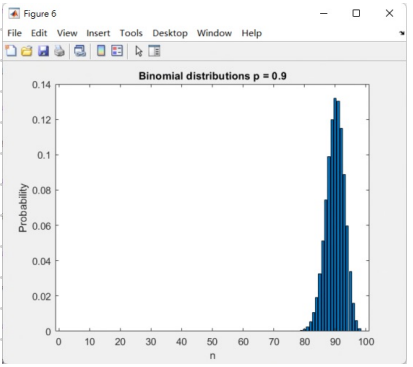
Figure 6
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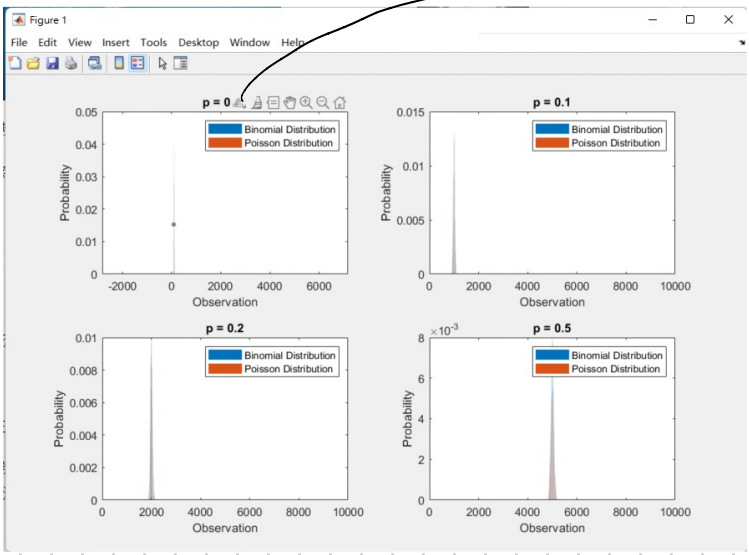
Binomial distributions p = 0.9
Probability
n

(2)



由上圖可推測出：

當 binomial distribution 的 p 越大，則與 poisson distribution 的誤差會越大

因為近似條件為 $n \to \infty$，$p \to 0$，

所以 $p = 0.1, 0.2, 0.5$ 時誤差較大

放大後兩色比較明顯