長庚大學期中、期末考試答案用紙

____ 學年度 第 ____ 學期 中 考　資工 系　姓名 呂重毅　學號 B0729027

1. $\frac{1}{10}$有，$\frac{9}{10}$沒有　$\sum_{x=0}^{10} (x;10,\frac{1}{10})$

$= C^{10}_x (\frac{1}{10})^x (\frac{9}{10})^{(10-x)}$

$f_X(x) \begin{cases} x=0 & b(0,10,\frac{1}{10}) \doteq 0.3487 \\ x=1 & b(1,10,\frac{1}{10}) \doteq 0.3874 \\ x=2 & b(2,10,\frac{1}{10}) \doteq 0.1937 \\ x=3 & b(3,10,\frac{1}{10}) \doteq 0.0574 \\ x=4 & b(4,10,\frac{1}{10}) \doteq 0.0112 \\ x=5 & b(5,10,\frac{1}{10}) \doteq 0.0015 \end{cases}$

$x=6 \; b(6,10,\frac{1}{10}) \doteq 0.0001$

$x=7 \; b(7,10,\frac{1}{10}) \doteq 0$

$x=8 \; b(8,10,\frac{1}{10}) \doteq 0$

$x=9 \; b(9,10,\frac{1}{10}) \doteq 0$

$x=10 \; b(10,10,\frac{1}{10}) \doteq 0$

$0, \; x \in R'S$

2. $E(X) = 10 \cdot \frac{1}{10} = 1 = nP$

3. X的標準差 $\sigma^2 = n \cdot p \cdot (1-p) = 10 \cdot \frac{1}{10} \cdot \frac{9}{10} = \frac{9}{10}$

$\sigma = \sqrt{\frac{9}{10}} = 0.9487$

4. $\sum_{x=0}^{10} (x;10,\frac{10-x}{100})$

$f_Y(y) \begin{cases} f_Y(0) = 0.3305 & f_Y(5) = 6.398e^{-4} \\ f_Y(1) = 0.4080 & f_Y(6) = 3.1e^{-5} \\ f_Y(2) = 0.2015 & f_Y(7) = 8.144e^{-7} \\ f(y(3) = 0.0518 & f_Y(8) = 1.0411e^{-8} \\ f(y(4) = 0.0076 & f_Y(9) = 5.1192e^{-11} \end{cases}$

$f_Y(10) = 5.777e^{-14}$

5. Y之期望：

$= \frac{172}{100} = 1.72$

Y之標準差：

（請翻面繼續作答）

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2.

(1) $f(w) = P(100,1) = \frac{e^{-1} 1^{100}}{100!} = 3.7417e^{-159}$

(2) $E[\infty] = \lambda t = 100 \times 1 = 100$

$u = \sigma^2 = 100 \quad \sigma^2 = \sqrt{100} \to \sigma = 10$

$E[w] + std(w] = 100 + 10 = 110$

(3) $\sum_{w=50}^{120} P(w,100)$

(4). $P(w>120) = 1 - P(w \le 120) = 1 - \sum_{w=0}^{120} (120,100) = 1 - 0.6087 = 0.3753$

(5) 接受，因為對帕松分布的機率而言，平均一天有可能會發生不只一次，也有可能好幾天都不發生，但從長遠來看，平均還是在一天一件

3.

(1) $P(X>9) = 1 - \binom{10}{x} (0.05)^x (0.95)^{100-x} \quad x = 0,1,2,3 \sim 9.$

$= 1 - 0.9718$

$= 0.0282$

(2). A byer would suspect the claim isn't correct because a correct claim probability of having 10 detective item in a sample is 1.675×10^{-2} and event would occur only 1.675% of time.

4. 令 $\mu = \alpha t = n \alpha \Delta t = nP$

$b(x;n,p)$

$= \frac{n!}{x!(n-x)!} p^x (1-p)^{n-x}$

$= \frac{n(n-1)(n-2)\cdots(n-x+1)}{x!} (\frac{\mu}{n})^x (1-\frac{\mu}{n})^{n-x}$

$= (1-\frac{1}{n})(1-\frac{2}{n})\cdots(1-\frac{x-1}{n}) \frac{1}{x!} \lambda^x ((1-\frac{\mu}{n})^{-\frac{n}{x}})^{-\mu} (1-\frac{\mu}{n})^{-x}$

t不變（即 μ 不變）而讓 $n \to \infty$ ($\Delta t \to 0$)，則

$(1-\frac{1}{n})(1-\frac{2}{n})\cdots(1-\frac{x-1}{n}) \to 1$

$(1-\frac{\mu}{n})^{-\frac{n}{\mu}} \to e$

$(1-\frac{\mu}{n})^{-x} \to 1$

所以 $b(x;n,p) \to \frac{\lambda^x e^{-\mu}}{x!}$（以 $P(x,\mu)$ 表之，P代表 Poisson）$\Rightarrow b(x;n,p) \xrightarrow{n \to \infty}$

因 $\sum_{x=0}^{\infty} P(x,\mu) = e^{-\lambda} \sum_{x=0}^{\infty} \frac{\mu^x}{x!} = e^{-\mu} e^{\mu} = 1$

（請翻面繼續作答）