_____ 學年度 第 ___ 學期 ___ 考 電機資訊三 系 姓名 鍾羽彥 學號 B0644226

1. $\frac{1}{10}$ 有R $\frac{9}{10}$ 無R

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

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

$$f_X(x) = \begin{cases} x=0 & C_0^{10} \cdot 0.1^0 \cdot (0.9)^{10} \\ x=1 & C_1^{10} \cdot 0.1^1 \cdot (0.9)^9 \\ x=2 & C_2^{10} \cdot 0.1^2 \cdot (0.9)^8 \\ x=3 & C_3^{10} \cdot 0.1^3 \cdot (0.9)^7 \\ x=4 & C_4^{10} \cdot 0.1^4 \cdot (0.9)^6 \\ x=5 & C_5^{10} \cdot 0.1^5 \cdot (0.9)^5 \\ x=6 & C_6^{10} \cdot 0.1^6 \cdot (0.9)^4 \\ x=7 & C_7^{10} \cdot 0.1^7 \cdot (0.9)^3 \\ x=8 & C_8^{10} (0.1)^8 (0.9)^2 \\ x=9 & C_9^{10} (0.1)^9 (0.9)^1 \\ x=10 & C_{10}^{10} (0.1)^{10} (0.9)^0 \end{cases}$$

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

(3) $\sigma^2 = n \cdot p(1-p) = 10 \cdot \frac{1}{10} \cdot \frac{9}{10} = \frac{9}{10}$

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

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

(5) 1.9

(6) $f_Z(z) = P(X=x) = C_{r-1}^{x-1} \cdot p^r (1-p)^{x-r} = C_4^{x-1} \cdot 0.1^5 \cdot 0.9^{x-5}$ $(x=5,6,7 \ldots)$

2.

$\lambda = 1 \cdot 100 = 100$

(1) $f_W(w) = P(X=k) = \frac{100^k}{k!} e^{-100}$

(2) $E(W) = \lambda w = 100$

$Var_W = \lambda w \Rightarrow \sigma_W = \sqrt{\lambda w} = 10$

$E(W) + \sigma_W = 110$

(3) $P(|W-100| \le 20) = P(80 \le W \le 120)$

$\Rightarrow P(X \le 120) - P(X \le 80)$

$= 0.9773 - 0.0174 = 0.9599$

(4) $P(W > 120)$

$= 1 - P(W \le 120)$

$= 1 - 0.9773$

$= 0.0227$

(5) 因0.0227極小，機率不會發生但確一直發生，若假設正確，則 $W > 120$ 不該發生，證「假設不為真」

3. $n = 100$

$X = 10$

① H_0 $p \le 0.05$

H_1 $p > 0.05$ Claim

P-value $P[Z > \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}]$

$= P\left[Z > \frac{\frac{10}{100} - 0.05}{\sqrt{0.05 \times 0.95 / 100}}\right]$

$= P[Z > 2.2942]$

$= 0.0109$

② Prob(10 or more defective | $p \le 0.05$) = 0.9891

Reject H_0

4

$b(x; n, p) = \binom{n}{x} \cdot p^x \cdot q^{(n-x)}$

$n \to \infty$, $p \to 0$, $np = u$: $P(x; u) = \frac{u^x}{x!} e^{-u}$

（請翻面繼續作答）