科目 ______

長庚大學期中、期末考試答案用紙

______學年度 第____學期____考______系 姓名 林[illegible] 學號 B0729036

1.

(1)

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

$x=0 \quad b(0, 10, \frac{1}{10}) \doteqdot 0.3487$

$x=1 \quad b(1, 10, \frac{1}{10}) \doteqdot 0.3874$

$x=2 \quad b(2, 10, \frac{1}{10}) \doteqdot 0.1937$

$x=3 \quad b(3, 10, \frac{1}{10}) \doteqdot 0.0574$

$x=4 \quad b(4, 10, \frac{1}{10}) \doteqdot 0.0112$

$x=5 \quad b(5, 10, \frac{1}{10}) \doteqdot 0.0015$

$x=6 \quad b(6, 10, \frac{1}{10}) \doteqdot 0.0001$

$x=7 \quad b(7, 10, \frac{1}{10}) \doteqdot 0$

$x=8 \quad b(8, 10, \frac{1}{10}) \doteqdot 0$

$x=9 \quad b(9, 10, \frac{1}{10}) \doteqdot 0$

$x=10 \quad b(10, 10, \frac{1}{10}) \doteqdot 0$

(2)

$n \times p = 10 \times \frac{1}{10} = 1$

(3)

$\sigma^2 = n \cdot p \cdot (1-p) = 10 \cdot \frac{1}{10} \cdot \frac{9}{10} = \frac{9}{10}$, $\sigma = \sqrt{\frac{9}{10}} = 0.9487$

(4)

2.

(1) $f_w(w) = P(w; 100) = \frac{e^{-100} \times (100)^w}{w!}$

(2) $E[w] = 100 \qquad Std[w] = \sqrt{100} = 10$

$E[w] + Std[w] = 110$

(3) $P(|w - E[w]| \leq 2 \cdot Std[w]) = P(|w-100| \leq 20) = P(80 \leq w \leq 120) = \sum_{w=80}^{120} P(w; 100)$

(5) 拒絕它，偏差值過高

（請翻面繼續作答）

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3.

(1)

$P(X=10) = C^{100}_{10} (0.05)^{10} (0.95)^{90}$

$= 0.016715 = 1.6715 \times 10^{-2}$

(2)

~~b~~ buyer would suspect the claim is not correct because assuming a correct claim, probability of having 10 defective item in sample is 1.6715×10^{-2} and event would occur only 1.6715% of time.

4.

The binomial distribution tends toward the Poisson distribution as: $n \to \infty$, $p \to 0$, $\lambda = np$ stays constant.

We need to show

$\binom{n}{x} p^x (1-p)^{n-x} \longrightarrow \frac{\lambda^x e^{-\lambda}}{x!}$

We will need:

$e^x = \lim_{n\to\infty} (1+\frac{x}{n})^n$

$\binom{n}{x} p^x (1-p)^{n-x}$

$= \binom{n}{x} (\frac{\lambda}{n})^x (1-\frac{\lambda}{n})^{n-x}$

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

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

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

$= \frac{n}{n} \cdot \frac{n-1}{n} \frac{n-2}{n} \cdots \frac{n-x+1}{n} = ((1-\frac{1}{n})(1-\frac{2}{n}) \ldots (1-\frac{x+1}{n})$

$\binom{n}{x} p^x (1-p)^{n-x} = \frac{\lambda^x}{x!} (1-\frac{1}{n})(1-\frac{2}{n}) \ldots (1-\frac{x+1}{n})(1-\frac{\lambda}{n})^n (1-\frac{\lambda}{n})^{-x}$

$= \frac{\lambda^x}{x!}$

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

$\times (1-\frac{\lambda}{n})^n$

$\times (1-\frac{\lambda}{n})^{-x}$

$\lim_{n\to\infty} \binom{n}{x} p^x (1-p)^{n-x}$

$= \frac{\lambda^x}{x!}$

$\times \lim_{n\to\infty} (1-\frac{1}{n})(1-\frac{2}{n}) \ldots (1-\frac{x+1}{n})$

$\times \lim_{n\to\infty} (1-\frac{\lambda}{n})^n$

$\times \lim_{n\to\infty} (1-\frac{\lambda}{n})^{-x}$

$\lim_{n\to\infty} \binom{n}{x} p^x (1-p)^{n-x}$

$= \frac{\lambda^x}{x!} \times 1 \times e^{-\lambda} \times 1$

$= \frac{\lambda^x e^{-\lambda}}{x}$

（請翻面繼續作答）