1.

(1)

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

$x=0 \quad b(0,10,\frac{1}{10}) \doteq 0.3487 \qquad x=6 \quad b(6,10,\frac{1}{10}) \doteq 0.0001$

$x=1 \quad b(1,10,\frac{1}{10}) \doteq 0.3874 \qquad x=7 \quad b(7,10,\frac{1}{10}) \doteq 0$

$x=2 \quad b(2,10,\frac{1}{10}) \doteq 0.1937 \qquad x=8 \quad b(8,10,\frac{1}{10}) \doteq 0$

$x=3 \quad b(3,10,\frac{1}{10}) \doteq 0.0574 \qquad x=9 \quad b(9,10,\frac{1}{10}) \doteq 0$

$x=4 \quad b(4,10,\frac{1}{10}) \doteq 0.0112 \qquad x=10 \quad b(10,10,\frac{1}{10}) \doteq 0$

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

(2)

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

(3)

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

2.

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

(2) $E[W] = 100 \qquad std[W] = \sqrt{100} = 10$

$E[W] + std = 110$

(3) $P(|W - E[W]| \le 2 \cdot Std[W]) = P(|W - 100| \le 20) = P(80 \le W \le 120)$

$= \sum_{w=80}^{120} p(w; 100)$

(5) reject, 偏差值過高

3.

(1)

$p(X=10) = C^{100}_{10} (0.03)^{10} (0.93)^{90}$

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

(2)

A buyer would suspect the claim is not correct because assuming a correct claim probability of having to detective item in sample is 1.6715×10^{-2} and event would occur only 1.6715% of time

[4]

$p(x=x) = (x^n) p^x (1-p)^{n-\lambda}$ for $\lambda = 0, 1, 2, 3, \ldots, n$, $\mu = np$, $\sigma^2 = np(1-p)$

Let $U_1 \ldots U_n$ be 獨立 Bernoulli random varibles

$Y = U_1 + \cdots U_n$

$E(x) = E(U_1 + \cdots U_n)$

$E(x) = E(U_1) + \cdots E(U_n) = p + \cdots p = np$

$Var(x) = Var(U_1 + \cdots U_n)$

$Var(x) = var(U_1) + \cdots Var(U_n)$

$= p(1-p) + \cdots + p(1-p) = np(1-p)$