[1] (6)

[2] (1) $f_W(w) = \dfrac{e^{-100}(100)^w}{w!}$ #

(2) $E[W] + Std[W] = 1 \cdot 100 + 1 \cdot 100 = 200$ #

(3) $P(\ |W-100| \leq 2 \cdot 100)$

$P(-2 \cdot 100 \leq W - 100 \leq 2 \cdot 100)$

$P(100 - 2 \cdot 100 \leq W \leq 100 + 2 \cdot 100) \geq 1 - \frac{1}{2^2} = \frac{3}{4}$

$P(100 - 2 \cdot 100 \leq W \leq 100 + 2 \cdot 100) \geq \frac{3}{4}$

(4) $P(W > 120)$

(5)

[3] (1)

(2) reject

銷售員宣稱出現不良品的機率不會超過5%，但在我們檢測100個產品時卻出現10個或更多的缺陷品，判斷不可信，拒絕

[4] e的定義：$\lim_{n\to\infty}\left(1-\frac{\lambda}{n}\right)^n = e^{-\lambda}$

二項分布的定義：$b(x;n,p)=\binom{n}{x}p^x(1-p)^{n-x}$

令 $p=\lambda/n$ $n\to\infty$ 時b的極限

$$\lim_{n\to\infty} b(X) = \lim_{n\to\infty}\binom{n}{x}p^x(1-p)^{n-x} = \lim_{n\to\infty}\frac{n!}{(n-x)!\,x!}\left(\frac{\lambda}{n}\right)^x\left(1-\frac{\lambda}{n}\right)^{n-x} = \lim_{n\to\infty}\underbrace{\left[\frac{n!}{n^x(n-x)!}\right]}_{F}\left(\frac{\lambda^x}{x!}\right)\underbrace{\left(1-\frac{\lambda}{n}\right)^n}_{\to\exp(-\lambda)}\underbrace{\left(1-\frac{\lambda}{n}\right)^{-x}}_{-1} = \lim_{n\to\infty}\underbrace{\left[\left(1-\frac{1}{n}\right)\left(1-\frac{2}{n}\right)\cdots\left(1-\frac{x-1}{n}\right)\right]}_{\to 1}\left(\frac{\lambda^x}{x!}\right)\underbrace{\left(1-\frac{\lambda}{n}\right)^n}_{\to\exp(-\lambda)}\underbrace{\left(1-\frac{\lambda}{n}\right)^{-x}}_{\to 1} = \left(\frac{\lambda^x}{x!}\right)\exp(-\lambda)$$