HW 1203 Q1   ch 5.3

$$P(X > 10200) = P\left(\frac{X - 10000}{\sqrt{10000}} > \frac{200}{\sqrt{10000}}\right)$$

$$= 1 - \phi(2) = 0.02275$$

HW 1202   Q2

$$P(X = x) = \frac{\lambda^x}{x!} e^{-\lambda}$$

$$E(X) = \lambda = 100$$

$$Var(X) = \lambda = 100$$

$\longrightarrow$ normalize

$$P\left(Z < \left|\frac{100 - A - \lambda}{\sqrt{\lambda}}\right|\right) = 0.9$$

$$\frac{100 - A - 100}{10} = -1.645$$

$$\boxed{A = 16.45}$$

HW 120203 10.

$EC X) = \frac{100}{6}$ $Var(x) = \sqrt{100 \times \frac{1}{6} \times \frac{5}{6}}$ $\color{red}{E(x) = np}$ $\color{red}{Var(x) = np(1-p)}$

$P(15 < X < 20) = P\left(\frac{15 - \frac{100}{6}}{\sigma(x)} < z < \frac{20 - E(x)}{\sigma(x)} \right) = P(-0.4472 < z < 0.8944)$

HW 1203 Q4

$p = \frac{1}{2}$ $n = 60$ north : $\neq$ south 區

$f(x) = \begin{cases} \frac{1}{2} & x = 50 \\ -\frac{1}{2} & x = -50 \end{cases}$

$2500 \times 60 = 150\,000$

$E(x) = 0$ $Var(x) = E(x^2) = 2500 \times \frac{1}{2} \times 2 = 2500$

$X \sim N(0, 150000)$

HW 1203 Q5

$f(x) = \begin{cases} \frac{1}{2} & \text{if } x = 5 \\ -\frac{1}{2} & \text{if } x = -5 \end{cases}$ $E(x) = 0$ $Var(x) = 25$

$X \sim N(0, 25 \times 50)$

$P(X < -15) = P\left(z < \frac{-75 - 0}{\sqrt{1250}} \right) = P(z < -2.12) \approx 0.0174$

HW1203 Q6

$$E(X) = \int_0^1 x \, 2x = \left[\frac{2}{3} x^3 \right]_0^1 = \frac{2}{3}$$

$$Var(X) = \left(\int_0^1 x^2 \, 2x \right) - \frac{4}{9} = \frac{1}{2} - \frac{4}{9} = \frac{1}{18}$$

$$X \sim N\left(\frac{40}{3}, \frac{1}{18} \times 20 \right)$$

$$P(S \leq 10) = P\left(Z \leq \frac{10 - \frac{40}{3}}{\sqrt{\frac{20}{18}}} \right) = P(Z \leq -3.1628) = 0.0007$$

HW1203 Q7

$$P(\mu - 1 < \overline{X} < \mu + 1)$$

$$\overline{X} \sim N\left(\mu, \frac{25}{n} \right)$$ ☆ Var $= \sigma^2$ experiment do n time, Var of $\overline{X} = \frac{\sigma^2}{n}$

$$P\left(\frac{\mu - 1 - \mu}{\sqrt{\frac{25}{n}}} < z < \frac{1}{\sqrt{\frac{25}{n}}} \right) = 0.95 \qquad \frac{1}{\sqrt{\frac{25}{n}}} = 1.96 \qquad n = \left(\frac{1}{1.96} \right)^2 \div 25$$

$$= 96.04 = 96$$

HW1203 Q8

$$X \sim N(1500, 100 \times 100)$$

$$P(X > 1700) = P\left(Z > \frac{200}{\sqrt{10000}} \right) = 0.0228$$