#9.2.1 (a)

$\text{bias}(\hat{\mu}_1) = 0$.

$\text{bias}(\hat{\mu}_2) = 0$.

$\text{bias}(\hat{\mu}_3) = 9 - \frac{\mu}{2}$.

불편추정치는 $\hat{\mu}_1, \hat{\mu}_2$

(b).

$\text{Var}(\hat{\mu}_1) = 6.25$.

$\text{Var}(\hat{\mu}_2) = 9.0625$.

$\text{Var}(\hat{\mu}_3) = 1.9444$.

$\hat{\mu}_3$ 분산이 제일 작다.

(c).

$\text{MSE}(\hat{\mu}_1) = 6.25$.

$\text{MSE}(\hat{\mu}_2) = 9.0625$.

$\text{MSE}(\hat{\mu}_3) = 1.9444 + (9 - \frac{\mu}{2})^2$.

$\hat{\mu}_1$의 평균제곱오차가 제일 작다.

#7.2.3. (a)

$Var(\hat{\mu}_1) = 2.5$.

(b).

$p = 0.6$ 일 때 $Var(\hat{\mu}) \doteq 2.43$ 로 제일 작다.

(c).

$r.e. = \frac{2.4}{2.5} = 0.96$.

#7.2.6

$MSE(\hat{\theta}_1) = 0.02\theta^2 + (0.13\theta)^2 = 0.0369\theta^2$.

$MSE(\hat{\theta}_2) = 0.01\theta^2 + (0.05\theta)^2 = 0.0125\theta^2$.

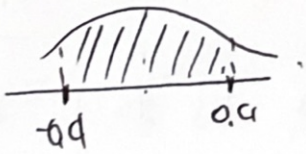
$MSE(\hat{\theta}_3) = 0.005\theta^2 + (0.24\theta)^2 = 0.06276\theta^2$.

$\hat{\theta}_1$ 이 가장 작으므로 가장 선호된다.

#7.3.3.(a)

$X \sim N(\mu, n)$.

$P(|N(0, \frac{n}{15})| \le 0.4) = 0.4416$.



(b).

$P(|N(0, \frac{n}{50})| \le 0.4) = 0.9150$.

#7.3.17

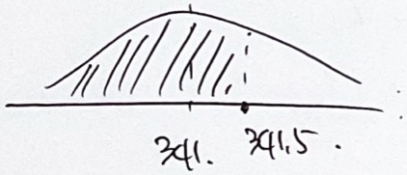
$\hat{\mu} = \bar{x} = 0.23181$.

$Se.(\hat{\mu}) = \frac{s}{\sqrt{n}}$.

$= \frac{0.07016}{\sqrt{15}} = 0.00810$.

#7.3.29

$X \sim N(341, \frac{\sigma^2}{20})$.



$P(N(341, \frac{\sigma^2}{20}) \leq 341.5)$.

$= P(N(0,1) \leq \frac{\sqrt{20} \times (341.5 - 341)}{\sigma})$

$= \Phi(1.118) = 0.868$.

#7.3.27

$\lambda = 0.02$.

1개. 1시간.

$P(X \geq 60) = e^{-0.02 \cdot 60} \doteq 0.301$.

4가 한 시간 이상 지속되는 부품이면

$P(0.301 - 0.05 \leq \frac{Y}{110} \leq 0.301 + 0.05)$.

$= P(27.6 \leq Y \leq 38.6)$.

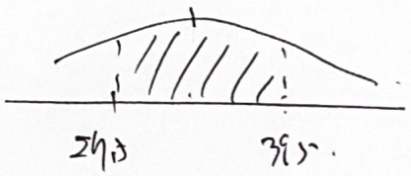
$= P(25 \le B(110, 0.301) \le 38)$

$\fallingdotseq P(24.5 \le N(110 \times 0.301,\ 110 \times 0.301 \times 0.699) \le 38.5)$.

$= P\left(\frac{24.5 - 33.11}{\sqrt{23.14}} \le N(0,1) \le \frac{38.5 - 33.11}{\sqrt{23.14}}\right)$.

$= \Phi(1.120) - \Phi(-1.766)$.

$= 0.869 - 0.122 = 0.747$.



#9.4.2

$\frac{a}{a+b} = 0.782$.

$\frac{ab}{(a+b)^2(a+b+1)} = 0.0083$. $\hat{a} = 15.28$ $\hat{b} = 4.26$.

#9.4.5

$E(X) = \frac{5}{\lambda} = \bar{x}$.

$\lambda = \frac{5}{\bar{x}}$.

$L(x_1, \cdots, x_n, \lambda) = \left(\frac{1}{24}\right)^n \cdot \lambda^{5n} \cdot x_1^4 \cdot \cdots \cdot x_n^4 \cdot e^{-\lambda(x_1 + \cdots + x_n)}$.

따라서 $\hat{\lambda} = \frac{5}{\bar{x}}$ 에서 최대이다.