

THE HONG KONG POLYTECHNIC UNIVERSITY
HONG KONG COMMUNITY COLLEGE

Subject Title : Information Processing and
Quantitative Methods

Subject Code : CCN1039

Session : Semester Two, 2016/17

Numerical Answers

Question B2

- (a) $P(L) = 0.6075$
- (b) $= 0.6369$

Question B3

- (a) $= 123,552$
- (b) $= 0.047539$

Question B4

- (a) $= 32.45$
 $s^2 = 83.886$
- (b) Coefficient of variation $\approx 28.2\%$

Question B5

- (a) Recommended decision : B
Payoff value = 16
- (b) Recommended decision : B
Payoff value = 12
- (c) Recommended decision : B
Maximum regret value = 2

Question C1

(a) Sample mean = $\frac{12+\dots+85}{20} = 48.35$

Mode = 67

Median = $\frac{52+54}{2} = 53$

(b) $i = 20 \times 85\% = 17$

85th percentile = $\frac{67+68}{2} = 67.5$

(c) Interquartile range = $65.5 - 35$
= 30.5

Standard deviation = $\sqrt{\frac{(12-48.35)^2+\dots+(85-48.35)^2}{19}}$
= 20.66

(d) Lower limit = $35 - 1.5 \times 30.5 = -10.75$

Upper limit = $65.5 + 1.5 \times 30.5 = 111.25$

There is no outlier as all the data lie within -10.75 and 111.25.

Question C2

EV(node 6) = $0.7(4.9) - 0.3(0.9) = 3.16$

EV(node 7) = $0.7(0.9) - 0.3(0.6) = 0.45$

EV(node 8) = $0.2(4.9) - 0.8(0.9) = 0.26$

EV(node 9) = $0.2(0.9) - 0.8(0.6) = -0.3$

EV(node 10) = $0.45(5) - 0.55(0.8) = 1.81$

EV(node 11) = $0.45(1) - 0.55(0.5) = 0.175$

EV(node 3) = Max {EV(node 6), EV(node 7), -0.1}
= 3.16

EV(node 4) = Max {EV(node 8), EV(node 9), -0.1}
= 0.26

EV(node 5) = Max {EV(node 10), EV(node 11), 0}
= 1.81

EV(node 2) = $0.6(3.16) - 0.4(0.26) = 2$

EV(node 1) = Max {EV(node 2), EV(node 5)}
= 2

Question C3

$$\begin{aligned} \text{(a)(i)} \quad P(X > K) &= 0.0307 \\ P\left(Z > \frac{K - 3.8}{0.24}\right) &= 0.0307 \\ \frac{K - 3.8}{0.24} &= 1.87 \\ K &= 4.2488 \end{aligned}$$

$$\begin{aligned} \text{(a)(ii)} \quad P(\bar{X} < L) &= 0.1170 \\ P\left(Z < \frac{L - 3.8}{\left(\frac{0.24}{\sqrt{6}}\right)}\right) &= 0.1170 \\ \frac{L - 3.8}{\left(\frac{0.24}{\sqrt{6}}\right)} &= -1.19 \\ L &= 3.6834 \end{aligned}$$

$$\text{(b)(i)} \quad n=9, p=0.7$$

$$\begin{aligned} P(X \geq 7) &= P(7) + \dots + P(15) \\ &= C_{15}^7 (0.7)^7 (0.3)^{15-7} + \dots + C_{15}^{15} (0.7)^{15} (0.3)^0 \\ &= 0.9848 \end{aligned}$$

$$\text{(b)(ii)} \quad n=9, p=0.3$$

$$\begin{aligned} P(X \geq 7) &= P(7) + \dots + P(15) \\ &= C_{15}^7 (0.3)^7 (0.7)^{15-7} + \dots + C_{15}^{15} (0.3)^{15} (0.7)^0 \\ &= 0.1311 \end{aligned}$$