Tutorial letter 201/2/2019

Basic Statistics
STA1510

Semester 2

Department of Statistics

SOLUTIONS TO ASSIGNMENT 01

Define tomorrow.

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QUESTION 1

The mode $= 87$ and 72. The dataset is bimodal.

Option 2

QUESTION 2

The median, $Q_2 = 61$.

Option 4

QUESTION 3

The distance between Q_1 and Q_3 is half the distance from the smallest to the largest observation.

Option 4

QUESTION 4

6 shoppers are between 20 and 29 years of age.

Option 3

QUESTION 5

$4 + 3 = \dfrac{7}{30} \times 100 = 23.33\%$ of the shoppers surveyed are 50 years or older.

Option 3

QUESTION 6

Weekly closing price of stocks is a continuous variable.

Option 2

QUESTION 7

$$
\begin{aligned}
P \text{ (Business man)} &= \frac{12}{110} \\
&= 0.1091
\end{aligned}
$$

Option 4

2

QUESTION 8

$$P \text{ (not a farmer)} = 1 - P \text{ (farmer)}$$
$$= 1 - \frac{24}{110}$$
$$= 0.7818$$

Option 5

QUESTION 9

Mutually exclusive events.

$$P(A) = 0.40$$
$$P(B) = 0.30$$
$$P(A \cap B) = 0 \quad A \text{ and } B \text{ are mutually exclusive events}$$
$$\therefore \quad P(A \cup B) = 0.4 + 0.3$$
$$= 0.7$$

Option 3

QUESTION 10

$$E(X) = \sum P(X_i) X_i$$
$$= (0 \times 0.10) + (1 \times 0.2) + (2 \times 0.5) + (3 \times 0.15) + (4 \times 0.05)$$
$$= 1.85$$

Option 4

QUESTION 11

Poisson distribution with $\lambda = 3$ policies/week.

$$P(X \geq 1) = 1 - P(X = 0)$$
$$= 1 - \frac{e^{-3}3^0}{0!}$$
$$= 1 - e^{-3}$$
$$= 0.9502$$

Option 5

QUESTION 12

Binomial distribution with $\pi = 0.25$

$$n = 5$$
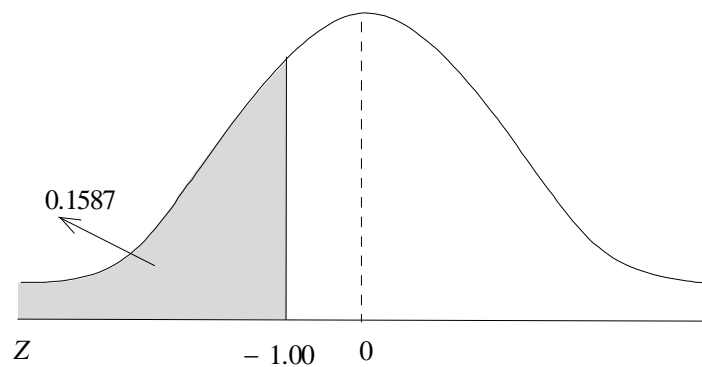
$$P(X = 0) = 5C_0 (0.25)^0 (0.75)^5$$
$$= 0.2373$$

Option 4

QUESTION 13

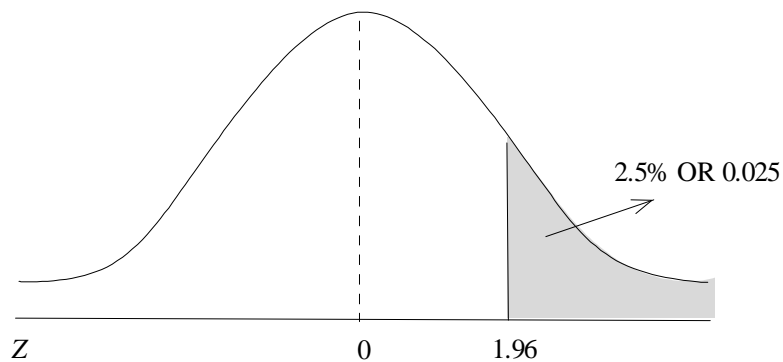Normal distribution with mean $= 100$ and standard deviation $= 5$

$$P(X < 95)$$
$$= P\left(Z < \frac{95 - 100}{5}\right)$$
$$= P(Z < -1.00)$$
$$= 0.1587 \text{ from normal tables}$$

Option 1

QUESTION 14

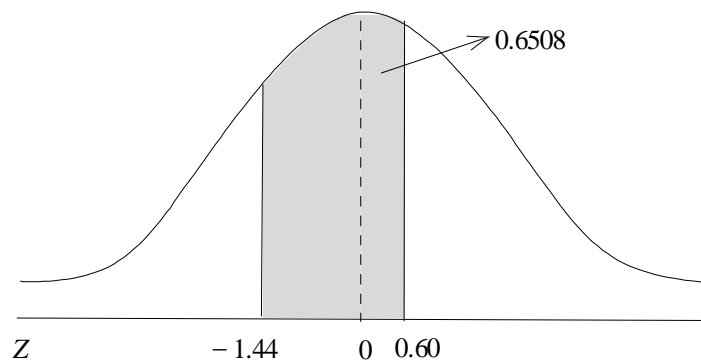Normal with $\mu = 100$ and $\sigma = 5$

$$Z = \frac{X - \mu}{\sigma}$$

$$\text{So, } X = \mu + z\sigma$$
$$= 100 + (1.96 \times 5)$$
$$= 109.80$$

Option 3

QUESTION 15

$$P(-1.44 < Z < 0.60)$$
$$= 0.7257 - 0.0749$$
$$= 0.6508$$

Option 3

QUESTION 16

Socio–economic status which was coded as $1 = $ low income, $2 = $ middle income, $3 = $ high income is an ordinal scaled variable.

Option 4

QUESTION 17

Q_1, the lower quartile

$$Q_1^{\text{th}} = \frac{n+1}{4} = \frac{14}{4} = 3.5^{\text{th}} \text{ which gives}$$
$$Q_1 \text{ as } \frac{3.3 + 3.4}{2} = 3.35$$

Option 2

QUESTION 18

$P(A) = 0.5,$ $\qquad P(B) = 0.40$ and $P(A/B) = 0.60$ then,

$$\begin{aligned} P(A \cap B) &= P(A|B) \times P(B) \\ &= 0.6 \times 0.4 \\ &= 0.24 \end{aligned}$$

Contingency table

	$P(A)$	$P(A')$	
$P(B)$	0.24	0.16	0.4
$P(B')$	0.26	0.34	0.6
	0.5	0.5	1.0

$$\begin{aligned} \therefore \quad P(A \cap B') &= 0.26 \text{ alternatively} \\ P(A \cap B) + P(A \cap B') &= P(A) \\ \therefore \quad P(A \cap B') &= 0.4 - 0.24 \\ &= 0.26 \end{aligned}$$
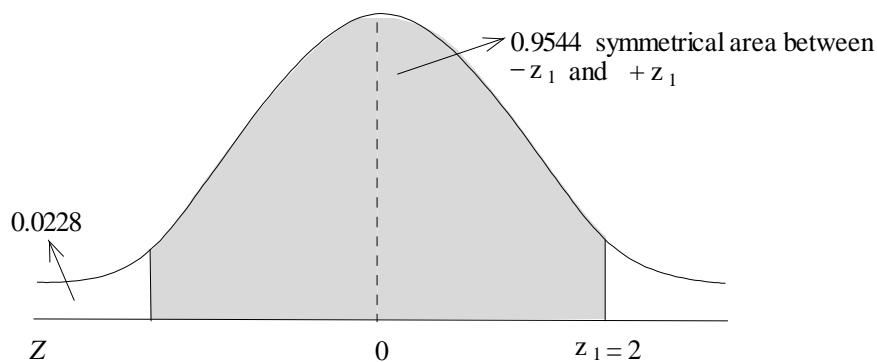
Option 4

QUESTION 19

Poisson distribution with $\lambda = 250/\text{month}$

$$\begin{aligned} P(X \geq 2) &= 1 - P(X \geq 1) \\ &= 1 - [P(X = 0) + P(X = 1)] \\ &= 1 - [0.0821 + 0.2052] \text{ (Poisson from tables)} \\ &= 1 - 0.2873 \\ &= 0.7127 \end{aligned}$$

Option 2

QUESTION 20

0.9544 symmetrical area between $-z_1$ and $+z_1$

0.0228

Z $\qquad$ 0 $\qquad$ $z_1 = 2$

Option 5

6