Tutorial letter 201/1/2019

Basic Statistics

STA1510

Semester 1

Department of Statistics

SOLUTIONS TO ASSIGNMENT 01

QUESTION 1

$\frac{12}{30} \times 100 = 40\%$ of the students scored above 80% in the statistics exam.

Option 3

QUESTION 2

The mean $\bar{X} = 39.33$ and the median $= 38.$ So, $\bar{X} > Q_2$ i.e. data is positively skewed

Option 3

QUESTION 3

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

Option 3

QUESTION 4

The mean may be too heavily influenced by the larger observations and this gives too high an indication of the centre.

Option 2

QUESTION 5

Between 30 and 39 years, i.e. $\frac{9}{30} = 30\%$

Option 2

QUESTION 6

$\frac{9}{30} = 30\%$

Option 1

QUESTION 7

Nominal data are categorical data with all categories having equal importance.

Option 4

QUESTION 8

Populations, statistics, samples

Option 5

QUESTION 9

P (Business woman) $= \frac{8}{110} = 0.0727$

Option 2

QUESTION 10

$$\begin{aligned} P \text{ (not a teacher)} &= 1 - P \text{ (teacher)} \\ &= 1 - \frac{66}{110} \\ &= 0.40 \end{aligned}$$

Option 3

QUESTION 11

Conditional events

$$\begin{aligned} P(A) &= 0.4 \\ P(B) &= 0.3 \\ P(A \cap B) &= 0.4 \times 0.3 \quad A \text{ and } B \text{ independent} \\ &= 0.12 \\ \therefore \quad P(B|A) &= \frac{0.12}{0.4} = 0.3 \end{aligned}$$

Option 5

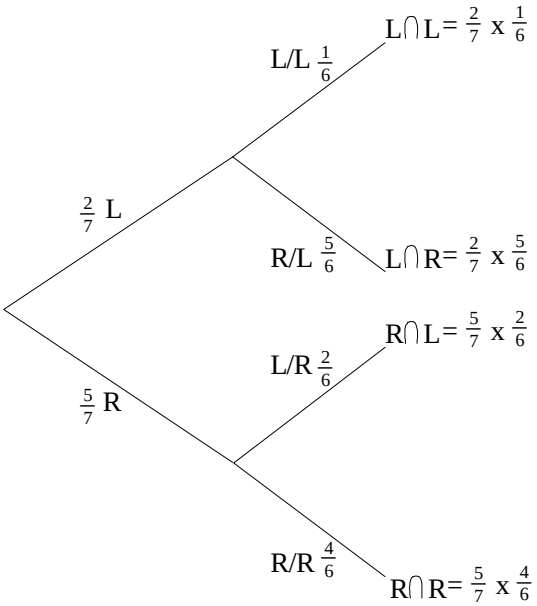
QUESTION 12

If $P(A) = 0.2$
$P(B) = 0.3$ and $P(A|B) = 0.9$

$$\text{then} \quad P(A|B) = \frac{P(A \cap B)}{P(B)} \Rightarrow P(A \cap B) = P(A|B) \times P(B)$$
$$= 0.9 \times 0.3$$
$$= 0.27$$

Option 3

QUESTION 13



Two different ways exist. $1R$ and $1L$ OR select $1L$ and $1R$. So,

$$\begin{aligned} P\,(R \text{ then } L) &= \left(\frac{5}{7}\right)\left(\frac{2}{6}\right) = \frac{5}{21} \\ P\,(L \text{ then } R) &= \left(\frac{2}{7}\right)\left(\frac{5}{6}\right) = \frac{5}{21} \end{aligned}$$

then add the 2 joint probabilities $P\,(1R \text{ and } 1L) = \frac{5}{21} + \frac{5}{21} = \frac{10}{21} = 0.4762$

Option 1

QUESTION 14

$$\begin{aligned} P\,(0 \leq X \leq 3) &= 1 - 0.05 \\ &= 0.95 \end{aligned}$$

Option 2

QUESTION 15

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

$$\begin{aligned} P\,(X = 3) &= \frac{e^{-3}3^3}{3!} \\ &= 0.2240 \end{aligned}$$

Option 1

QUESTION 16

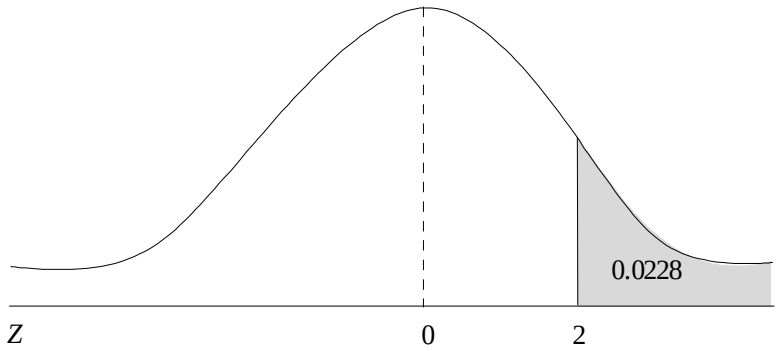
Binomial distribution with $\pi = 0.25$.
$n = 5$

$$\begin{aligned} P(X > 3) &= P(X = 4) + P(X = 5) \\ &= 0.0146 + 0.0010 \text{ from tables} \\ &= 0.0156 \end{aligned}$$

Option 3

QUESTION 17

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



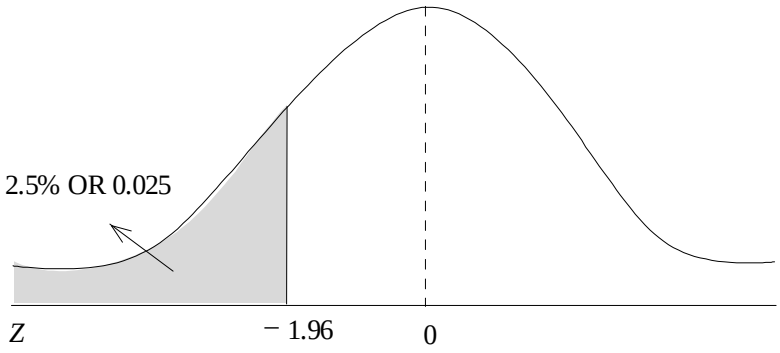
$$\begin{aligned} & P(X > 110) \\ = \; & P\left(Z > \frac{110 - 100}{5}\right) \\ = \; & P(Z > 2) \\ = \; & 0.0228 \text{ from normal tables} \end{aligned}$$

Option 2

QUESTION 18

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

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

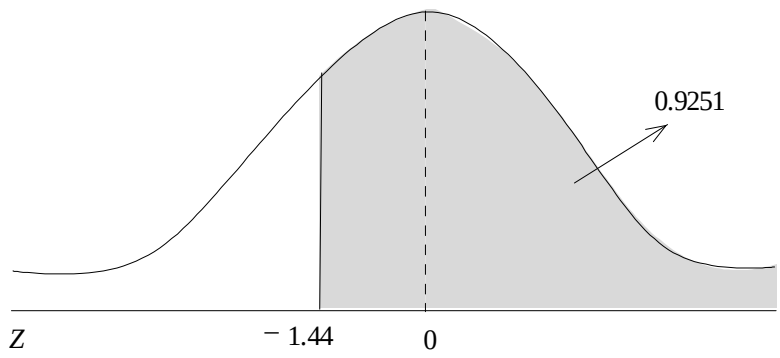


So,

$$\begin{aligned} X &= \mu + Z\sigma \\ &= 100 + (-1.96 \times 5) \\ &= 90.20 \end{aligned}$$

Option 2

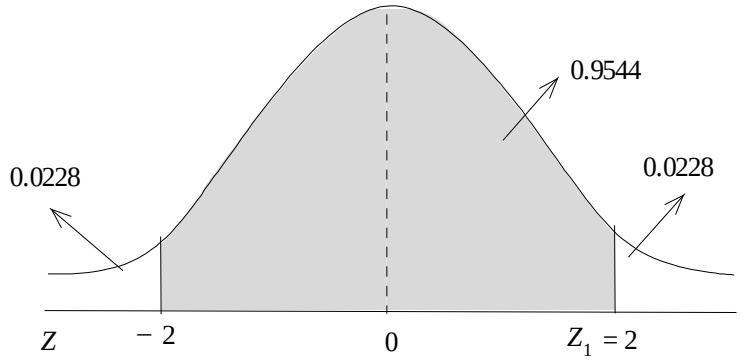
QUESTION 19



$P\,(Z > -1.44) = 0.9251$ from the normal tables.

Option 5

QUESTION 20



Symmetrical area between $-z_1$ and $+z_1$

Option 5