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Business Statistics-STA 220

Submitted BY

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Answer to the question no-1

The scores of the Ten students in victoria university of Bangladesh are, 85, 95, 63, 78, 70 70, 56, 64, 72, 66. The students mean is

$$\mu = \frac{85+95+63+78+70+70+56+64+72+66}{10}$$

$$= \frac{719}{10}$$

$$= 71.90$$

Now a random sample of six scores from this students is taken and this sample includes the scores 70, 85, 95, 64, 66, 63. The mean for this sample is

$$\bar{x} = \frac{70+85+95+64+66+63}{6}$$

$$= \frac{443}{6}$$

$$= 73.83$$

Consequently, sampling error $= \bar{x} - \mu$

$$= 73.83 - 71.90$$

$$= 1.93$$

That is, the mean score estimated from the sample is 1.93 higher than the mean score of the students. Note that this of difference occurred due to chance that is because we used a sample instead of the students.

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Answer to the question no-2

For the Population of Dhaka City

N = Population Size = 8,00,000

x = families in the Population who own homes
= 1,21,894

The Proportion of all families in this city who own homes is,

$$P = \frac{x}{N} = \frac{1,21,894}{8,00,000}$$

$$= \cdot 1523675$$

Now a Sample of 720 families is taken from Dhaka city, and 120 of them are home-owners Then,

n = Sample size = 720

n = families in the sample who own homes
= 120

The Sample Proportion is,

$$\hat{P} = \frac{n}{n} = \frac{120}{720}$$

$$= \cdot 16666666667$$

As in the Case of the mean the different between the Sample Proportion and to corres-ponding population gives the sampling error That is the case of the Proportion,

$$\text{Sampling error} = \hat{P} - P$$

$$= (\cdot 16666666667 - \cdot 1523675)$$

$$= -\cdot 0142991667$$

$$= -\cdot 01$$

Answer to the question no - 3

Shows all the calculations required for the computation of the standard deviation of x.

x	$P(x)$	$xP(x)$	x^2	$x^2P(x)$
0	.10	.00	0	.00
1	.20	.20	1	.20
2	.30	.60	4	1.20
3	.40	.120	9	3.60
4	.50	.200	16	8.00
5	.60	.300	25	15.00
		$\Sigma xP(x) = 1.42$		$\Sigma x^2P(x) = 28$

we perform the following steps to compute the standard deviation of x.

Step 1. compute the mean of the discrete random variable,

The sum of the products $xP(x)$ recorded in the third column of table gives the mean of x.

$\mu = \Sigma xP(x) = 1.42$ defective computer parts in 400.

Step 2. compute the value of $\Sigma x^2P(x)$

First we square each of x and record

it in the fourth column of table. Then we multiply these values of x^2 by the corresponding values of $P(x)$. The resulting values of $x^2P(x)$ are recorded in the fifth column of table. The sum of this column us,

$$\Sigma x^2 P(x) = 28$$

<u>Step 3</u> Substitutie the values of μ and $\Sigma x^2 P(x)$ the formula for the standard deviation of x and simplify.

By performing this step we obtain

$$\sigma = \sqrt{\Sigma x^2 P(x) - \mu^2}$$

$$= \sqrt{28 - (1.42)^2}$$

$$= \sqrt{28 - 2.0164}$$

$$= \sqrt{25.9836}$$

$$= 5.097$$

Thus a given shipment of 400 computer parts is expected to contain an average of 1.42 defective parts with a standard deviation of 5.097.

Because the standard deviation of a discrete random variable is obtained by taking the positive square root, it's value is never nagative.

Answer to the question no-4

Discuss about intersection of events there are given below:- The intersection of events A and B, denoted by $A \cap B$, consists of all outcome that are in both A and B.

Complement of an event: The complement of event A, denoted by A^c, consists of all outcome that are not in A.

mutually exclusive or disjoint: Events are mutually exclusive or disjoint if they cannot occur simultaneously.

Null event:- The event containing no outcomes, it is the complement of sample space S.

venn diagram: A graphical representation of events.

Probability of an event:- The probability of event A, denoted by P(A), is the probability that the outcome of the experiment is contained in A.

Addition rule of probability: The formula
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

conditional probability:- The probability of one event given the information that a second event has occurred. we de-note the conditional probability of B given that A has occurred by $P(B|A)$.

<u>multiplication rule</u> :- The formula

$P(A \cap B) = P(A) P(B|A)$

A generalized version of the multiplication rule is given by

$P(A_1 \cap A_2 \cap \cdots \cap A_n) = P(A_1) P(A_2)$

<u>Independent</u> :- Two events are said to be independent if knowing whether a specific one has occurred does not change the probability that the other occurs.

One the other hand any set of the experiment is called an event. we designate events by the letter A, B, C, and so on. we say that the event A occurs whenever the outcome is contained in A.

For any two events A and B, we define the new event $A \cup B$, called the union of events A and B, to consist of all outcomes that are in A or in B or in both A and B. That is the event $A \cup B$ will occur if either A or B occurs.

So intersection of events are very important.