STATS

LESSON 1 (RAMDOM VARIABLE)

Random Variable - a variable (typically represented as x) that has a single numerical value, determined by chance, for each outcome of a procedure.

TYPES OF RANDOM VARIABLE

1. Discrete Random Variable
   - It is a collection of values that is finite or countable.
2. Continues Random Variable
   - It has infinitely many values, and the collection of values is not countable.

EXAMPLE #1 TWO COINS ARE TOSSED

Step 1: Sample Outcome

COIN 1	COIN 2	
H	H	HH = 2
	T	HT = 1
T	H	TH = 1
	T	TT = 0

Step 2: Sample Space (total outcome)

$2 \bullet 2 = 4$

Step 3: P. D. T (Probability Distribution Table)

Z	0	1	2
P(z)	¼	½	¼

- let z be the random variable representing the number of heads that occurs. Find the value of the random variable Z with its corresponding probabilities.

EXAMPLE #2 TWO FAIR DICE ARE THROWN SIMULTANEOUSLY

<u>Step 1: Sample Outcome</u>

2	3	4	5	6	7
3	4	5	6	7	8
4	5	6	7	8	9
5	6	7	8	9	10
6	7	8	9	10	11
7	8	9	10	11	12

<u>Step 2: Sample Space</u>

6 • 6 = 36

Step 3: PDT

X	P(x)
2	1/36
3	1/18
4	1/12
5	1/9
6	5/36
7	1/6
8	5/36
9	1/9
10	1/12
11	1/18
12	1/36

X	**0**	**1**	**2**	**3**	**4**	**5**	**6**
P(x)	**. 11**	**. 19**	**. 28**	**. 15**	**. 12**	**. 004**	**. 006**

1. P(3) = 0.15
2. P(x>2) = 0.39
3. P(x<4) = 0.73
4. P(1<x<4) = 0.43

if x is a random variable with x elements, then

a. They probability of each value is between 0 and 1
   0 < P(x) < 1
b. They sum of all probabilities is 1

WEEK #2

Expected Value, Theoretical Mean, Mean of D. R. V ~ ARE ALL SAME

M=E(x) =

Step 1: Step 4: Step 5:

x	P(x)	x • P(x)	x’2	x’2 • P(x)
0	¼	0	0	0
1	½	½	1	½
2	¼	½	4	1

Step 2: M= 1 Step 6: =1 ½ = 3/2

Step 3: M'2= 1 Step 7: Var(x)= 0’2 = S6-S3

$3/2 - 1 = ½$

Step 8: $std(x) = \sqrt{Var(x)} = \sqrt{S7}$

$= \sqrt{1/2} = \sqrt{1}/\sqrt{2} = 1/\sqrt{2} ° \sqrt{2}/\sqrt{2}$

$= \sqrt{2}/2$

LESSON 3: NORMAL DISTRIBUTION

Formula: z = x-m/(sigma)

z= standard deviation

x= raw score/normal score

M= population mean

sigma= population standard

EXAMPLE 1

Step 1: Given & Unknown

z= ?

x= 88

M= 81

sigma= 6

Step 2: Find z score

z = 88-81/6

z = 1.17

Step 3: Find the probability

Probability = $P(z>1.17) = 0.1210$

LESSON 4: Mean & Variance

Mx = mean of sample means

M = population mean

sigma'2 x = variance of the sample means

Sigma'2 = population variance

n = sample size

sigma x = sample standard deviation of the sample means

sigma = population standard

N-n/N-1 = Finite Population Correction Factor (PPCF)

LESSON 5: Sampling Distribution of Large Sample size

Formula: $z = \bar{x} - \mu / \sigma/\sqrt{n}$

$\bar{x}$: sample mean

μ: population mean

σ: population standard deviation

n: sample mean

EXAMPLE 1

Step #1: Given & Unknown

$z = \bar{x} - \mu / \sigma/\sqrt{n}$

$\bar{x}$: 7

μ: 6

σ: 3.2

n: 5

$P(\bar{x} < 7) = ?$

Step #2: Find z

$z = 7 - 6 / 3.2/\sqrt{5}$

= 2.32

Step #3: Find $P(\bar{x} < 7)$

$P(z<2.32)=0.9898$

LESSON 6: Margin of error and Length of Confidence interval

$\bar{x} - ta/2\ (s/\sqrt{n}\ ) < \mu < \bar{x} + ta/2\ (s/\sqrt{n}\ )$

$\bar{x}$: sample mean

ta/2: t-value for two tailed

s: sample standard deviation

n: sample size

Confidence level (CL) of an interval estimate of a parameter is the probability that the interval estimate will contain the parameter, assuming that a large number of samples are selected and that the estimation process on the same parameter is repeated (Bluman, 2014)

The margin of error, also called the maximum error of the estimate, is the maximum likely difference between the point estimate of a parameter and the actual value of the parameter.

REFERENCE

https://www.scribd.com/presentation/395633175/C1-Lesson-1-Exploring-Random-Variables

https://study.com/skill/learn/how-to-calculate-the-variance-of-a-discrete-random-variable-explanation.html