Serial ⇒ 35

L-01/ 23.07.2023/

Probability

⊛ Chance or likelihood that a particular outcome will occur.

$S=\{1,2,3,4,5,6\}$

⊛ Experiment ⇒ Die, Coin

$\{H, T\}$

⊛ Sample Space ⇒ Set of all possible outcome.

⊛ Coin tosses three times:

$$S=\{TTT, TTH, THT, THH, HTT, HTH, HHT, HHH\}$$

⊛ Number of sample space elements $= x^n$

n → Number of trial

x → Number of Outcome

⊛ One Die tosses two times,

Sample space $= 6^2 = 36$ elements

⊛ Answer from Slide :

2 ⇒ $S = \{2, 3, 5, 7, 11, 13\}$

3 ⇒ $S = \{0, 1, 2, 3, \dots, n\}$

4 ⇒ $S = \{0, 1, 2, 3, 4\}$

5 ⇒ S = {each day of a year, 29 February if it is leap year}

6 ⇒ $S = \{TS, TU, LS, LU\}$

L-02 / 25.07.2023 /

MMRh

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Probability Values

$0 \le P(A) \le 1$

Measurement of Probability:

1. Classical approach

$$P(A) = \frac{n(A)}{n(S)}$$

A → event

$S = \{1, 2, 3, 4, 5, 6\}$

A = even numbers $= \{2, 4, 6\}$

$$P(A) = \frac{3}{6} = \frac{1}{2} \cancel{A}$$

2. Relative frequency approach

$$P(A) = \lim_{n \to \infty} \frac{m}{n}$$

n → no of trials

m → no of trials in favour of A in n trials.

3. Subjective Approach

From observation or previous record.

2/

$i + ii + iii = 0.08 + 0.20 + 0.33$

$= 0.61$

$iv + v = 1 - 0.61 = 0.39$

$iv = v = 0.39/2 = 0.195$

(i) $v = 0 \le P(v) \le 0.39$

(ii) $iv = v = 0.195$

4/ $S = \{1, 2, 3, 4, 5, 6\}$

$A = \{1, 2\}$

$A^c = \{3, 4, 5, 6\}$

5/ ~~A =~~

Exercise from Slide & Book

$\boxed{1.1.4}$

Class work from Page-4

1·1·10/

$P(i) = 6x = \frac{6}{10} = 0.6$

$P(ii) = 3x = \frac{3}{10} = 0.3$

$P(iii) = x = \frac{1}{10} = 0.1$

$10x = 1$

$x = 0.1$

L-3/30.07.2023/

Conditional Probability

$$P(A|B) = \frac{P(A\cap B)}{P(B)} \; ; \; P(B) > 0$$

already occur

known

Given

if A don't depend on B

then, $P(A|B) = P(A)$

⊛ Independent of event

⇒ two event will said to be independent if,

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

$$P(A|B) = \frac{P(A\cap B)}{P(B)} = \frac{P(A)\times P(B)}{P(B)} = P(A)$$

Class works :

~~I battery lasts longest~~ $\cancel{P(I) = (0.39 + 0.03)}$

$\cancel{= 0.42}$

$P(I) \cap P(II) = 0.03$

$P(II) = (1 - \cancel{0.2}\; 0.24 - 0.39) = 0.37$

$P(\text{2 lasts long} \mid \text{22 not fail first}) = \frac{0.03}{0.37}$

L-4 / 01.08.2023 /

Random Variable

- Random variable that relates with probability.

- Coin - 2 times tosses:

$S = \{HH, HT, TH, TT\}$

X = No of heads

$= \{0, 1, 2\}$

minimum head = 0

maximum head = 2

$P(X-0) = \frac{1}{4}$

How many 0 head

main sample space

$P(X-1) = \frac{2}{4}$

$P(X-2) = \frac{1}{4}$

⊛ Height is continuous variable

⇒ Like, minimum height 3' to maximum height 7', it can takes any ~~val~~ value of height.

i.e.: 4·5, 4·555, 4·9999 .... etc

⊛ PMF ⇒ Probability Mass Function is used for descreate random variable.

$x = \{\text{The score shown on top face}\}$

$= \{1, 2, 3, 4, 5, 6\}$

$P(x) = \{\frac{1}{6}, \frac{1}{6}, \dots \frac{1}{6}\}$

~~⊛ Die ha throw~~

⊛ Die tosses twitch:

$S = 36$

x = no of 6 comes on ~~the~~ two dies.

$= \{0, 1, 2\}$

$\therefore$

X	0	1	2	Total
$p(x)$	$\frac{25}{36}$	$\frac{10}{36}$	$\frac{1}{36}$	1

CDF = Cumulitive Distribution:

x	0	1	2
$p(x)$	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{1}{4}$
CDF	$\frac{1}{4}$	$\frac{3}{4}$	1

$$CDF(x) = p(x) = \cancel{p(x}.\ P(X \leq x).$$

L-5/06.08.2023/

Class-Work

a) $P(x=4) = 1 - 0.08 - 0.11 - 0.27 - 0.33$

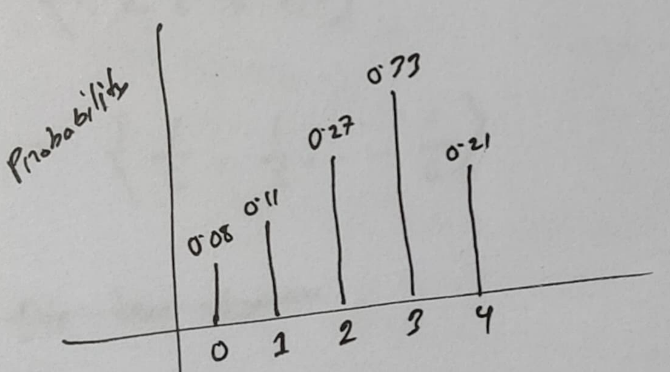
$= 0.21$

x	0	1	2	3	4
$P(x)$	0.08	0.11	0.27	0.33	0.21

i. $P(x) \geq 0$

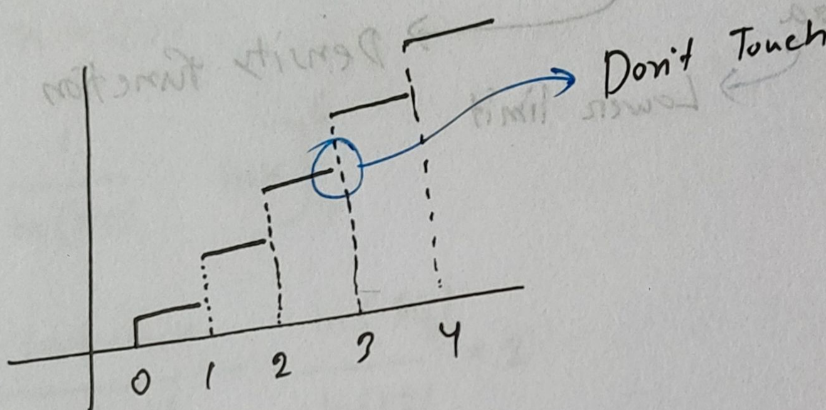
ii. $\sum_{i=0}^{4} P(x_i) = 1$

b)



c)

x	0	1	2	3	4
P(x)	0.08	0.11	0.27	0.33	0.21
F(x)	0.08	0.19	0.46	0.79	1



⊛ Probability density function

x is a random variable

$$a < x < b$$

$f(x) \rightarrow$ probability density function

i) $f(x) \geq 0$

ii) $\int_a^b f(x)\,dx = 1$

Do exercise from slide

⊛ CDF

$$F(x) = P[X \le x]$$

Random Variable

Value of a random variable

$$F(x) = \int_{a}^{x} f(x)\, dx$$

Density function

Lower limit

L-6 / 08.08.2023 /

⊛ Given density function,

$$f(x) = \frac{1}{x \ln(1.5)}$$

(i) $\int_4^6 \frac{1}{x \ln(1.5)} \, dx$

$$= \frac{1}{\ln(1.5)} \cdot \ln x \Big]_4^6$$

$$= \frac{\ln 6 - \ln 4}{\ln(1.5)} = \frac{\ln(6/4)}{\ln(1.5)} = 1$$

(ii) Same as (i), replace the limit

(iii) Same, replace the limit $[4, x]$

⊛ Expectation of a Random variable :

x	1	2	3	4
$P(x)$	$\frac{1}{4}$	$\frac{2}{4}$	0	$\frac{1}{4}$

$$\boxed{E(x) = \sum x \cdot P(x)}$$

$$= \left(1 \times \frac{1}{4}\right) + \left(2 \cdot \frac{2}{4}\right) + (3 \cdot 0) + \left(4 \cdot \frac{1}{4}\right)$$

$$= \frac{1}{4} + 1 + 0 + 1$$

$$= \frac{9}{4} = 2.25$$

if the variable is continuous:

$$\boxed{E(x) = \int_a^b x \cdot f(x)\, dx}$$

(iv) $E(x) = \int_{49.5}^{50.5} x f(x)\, dx$

$= \int_{49.5}^{50.5} x\left[1.5 - 6(x-50.0)^2\right] dx$

$= \cdots$

⊛ Variance:

$V(x) = E(x^2) - (E(x))^2$

$E(x^2) = \cancel{E(x)}\ \Sigma x^2 P(x)$

$E(x) = \Sigma x P(x) = 1.76$

⊛ Standard deviation:

$SD(x) = +\sqrt{V(x)}$

$\boxed{\begin{array}{l}\text{⊛ Assignment - 1:} \\ \text{Chapter-2} \\ \text{Date: 20.08.2023}\end{array}}$

L-7/13.08.2023/

⊛ Quantiles:

total 100% observation

25% | 25% | 25% | 25%

Q_1 Q_2 Q_3

Q_2 → Median

Q_1 → 25% <

Q_2 → 50% <

Q_3 → 75% < 100%

$(Q_1, Q_3) \Rightarrow$ Inter quartile range $\Rightarrow$ 50% observation

$F(x)$ = cumulative distribution function

$$= \int_a^x f(x)\,dx$$

a → Lower limit

$$= \sum_{low}^{x} f(x)$$

$F(x) = 1$; if $x = b$ (Higher limit)

$$= \int_a^b f(x)\,dx = 1$$

b → High

a → Low

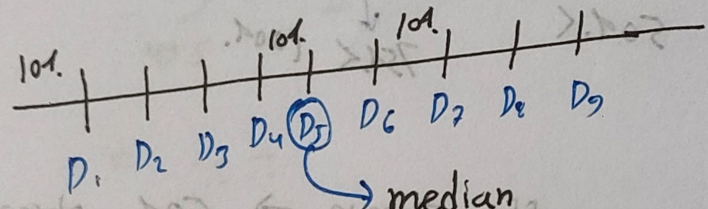
$F(x) = 0.25$; $x = Q_1$

$F(x) = 0.5$; $x = Q_2$

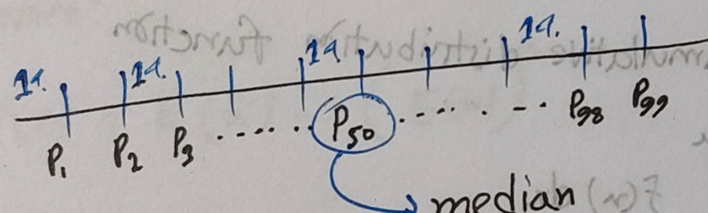
$F(x) = 0.75$; $x = Q_3$

⊛ Interquartile range $= IQR = Q_3 - Q_1 = 0.75 - 0.25$
$= 0.50$

Decile



Percentile



Example:

(v) $F(x) = 0.25$

$$\Rightarrow \int_{49.5}^{x} f(x) = 0.25$$ $\Rightarrow$ solve and find value of x. Then compare with the given range and select the right ans.

Classwork

$$\int_4^x \frac{1}{x\ln(1.5)}\,dx = \left[\frac{\ln x}{\ln(1.5)}\right]_4^x$$

$$= \frac{\ln x - \ln 4}{\ln(1.5)} = \underbrace{0.25,\ 0.50,\ 0.75}_{\text{then solve for } x.}$$

⊛ Problem 2.4.18

$$f(x) = \frac{1-x}{2}\ ; \quad -1 \le x \le 1$$

$$E(X) = \int_{-1}^{1} \frac{x - x^2}{2}\,dx = \int_{-1}^{1}\left(\frac{x}{2} - \frac{x^2}{2}\right)dx$$

$$= \left[\frac{x^2}{4} - \frac{x^3}{6}\right]_{-1}^{1} = \frac{1}{4} - \frac{1}{6} - \frac{1}{4} - \frac{1}{6}$$

$$= -\frac{2}{6} = -\frac{1}{3}$$

$$V(X) = E(x^2) - [E(X)]^2 = \frac{1}{3} - \left(-\frac{1}{3}\right)^2 = \frac{1}{3} - \frac{1}{9}$$

$$= \frac{2}{9}$$

$$E(X^2) = \int_{-1}^{1} x^2 f(x)\,dx = \int_{-1}^{1} \frac{x^2 - x^3}{2}\,dx = \left.\frac{x^3}{6} - \frac{x^4}{8}\right]_{-1}^{1}$$

$$= \frac{1}{6} - \frac{1}{8} + \frac{1}{6} + \frac{1}{8} = \frac{1}{3}$$

$$SD(X) = \sqrt{V(X)} = \sqrt{\frac{2}{9}} = \frac{\sqrt{2}}{3}$$

c) $\displaystyle\int_{-1}^{x} \frac{1-x}{2}\,dx$

$= \frac{1}{2}\int_{-1}^{x}(1-x)\,dx = \frac{1}{2}\left[x-\frac{x^2}{2}\right]_{-1}^{x} = \frac{1}{2}\left(x-\frac{x^2}{2}+1+\frac{1}{2}\right)$

$\Rightarrow \frac{1}{2}\left(x-\frac{x^2}{2}+1.5\right) = 0.75$

$\Rightarrow x-\frac{x^2}{2} = 1.5-1.5 = 0$

$\Rightarrow x^2-2x = 0$

$\Rightarrow x(x-2) = 0$

$\therefore x = 0, 2$

out of range

in range

correct ans.

L-8/20.08.2023/

Joint Probability distribution

X, Y

$f(x,y)$

(i) $f(x,y) \geq 0$

(ii) $\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} f(x,y)\, dx\, dy = 1$

Marginal probability distribution of X

$$g(x) = \int_{-\infty}^{\infty} f(x,y)\, dy$$

$$h(y) = \int_{-\infty}^{\infty} f(x,y)\, dx$$

Conditional distribution

$$f(y|x) = \frac{f(x,y)}{g(x)} \; ; \; g(x) > 0$$

same as conditional probability

$$P(A|B) = \frac{P(A \cap B)}{P(B)} \; ; \; P(B) > 0$$

Similarily,

$$f(x|y) = \frac{f(x,y)}{h(y)} \; ; \; h(y) > 0$$

⊛ Independence of Random Variable:

if, $f(x,y) = g(x) \cdot h(y)$

Then, X, Y is independence

⊛ Covariance:

$$Cov(X,Y) = E[\{X - E(X)\}\{Y - E(Y)\}]$$

or,

$$= E(XY) - E(X)E(Y)$$

⊛ Correlation between X & Y

$$Corr(X,Y) = \frac{Cov(X,Y)}{\sqrt{Var(X) \cdot Var(Y)}}$$

$\rho \Rightarrow$ for population

$-1 \leq \rho \leq 1$

$r \Rightarrow$ for other sample

$0 \leq r \leq 1$

Problem from Lecture-7

a) $$\int_4^6\int_{-2}^{3} A(x-3)y \, dx\, dy = A\int_4^6 y\left[\frac{x^2}{2}-3x\right]_{-2}^{3} dy$$

$$= A\int_4^6 -\frac{25}{2}y\, dy$$

$$= A \cdot -\frac{25}{2}\cdot\left[\frac{y^2}{2}\right]_4^6$$

$$= -A\frac{25}{2}\cdot 10$$

$$= -125A$$

Here,

$-125A = 1$

$\therefore A = -\frac{1}{125}$

$$\therefore f(x,y) = -\frac{1}{125}(x-3)y$$

$$= \frac{(3-x)y}{125}$$

b) $$\frac{1}{125}\int_4^5\int_0^1 (3-x)y\, dx\, dy = \frac{1}{125}\int_4^5 y\left[3x-\frac{x^2}{2}\right]_0^1 dy$$

$$= \frac{1}{50}\int_4^5 y\, dy = \frac{1}{50}\cdot\left.\frac{y^2}{2}\right]_4^5$$

$$= \frac{1}{50}\cdot\frac{9}{2}$$

$$= \frac{9}{100}$$

c)

$$g(x) = \frac{1}{125}\int_4^6 (3-x)y\,dy$$

$$= \frac{3-x}{125}\left.\frac{y^2}{2}\right]_4^6$$

$$= \frac{3-x}{125}\cdot 10$$

$$= \frac{2(3-x)}{25}\ ;\ -2\le x\le 3$$

$$h(y) = \frac{1}{125}\int_{-2}^{3}(3-x)y\,dx$$

$$= \frac{y}{125}\left[3x-\frac{x^2}{2}\right]_{-2}^{3}$$

$$= \frac{y}{125}\cdot\frac{25}{2}$$

$$= \frac{y}{10}\ ;\ 4\le y\le 6$$

d)

$$g(x)\cdot h(k) = \frac{2(3-x)}{25}\cdot\frac{y}{10}$$

$$= \frac{y(3-x)}{125}$$

∴ independence.

Next Sunday Quiz-1

L1-5

Assignment - next class

L-7/22.08.2023

e) $f(x|y) = \dfrac{f(x,y)}{h(y)} = \dfrac{f(x,5)}{h(5)} = \dfrac{\frac{1}{125}(3-x)\cdot 5}{5/10}$

$= \dfrac{2}{25}(3-x); \ -2 \le x \le 3$

f)

$E(x) = \int x \, g(x) \, dx$

$= \int_{-2}^{3} x \cdot \dfrac{2}{25}(3-x) \, dx$

$= \dfrac{2}{25} \int_{-2}^{3} (3x - x^2) \, dx$

$= \dfrac{2}{25} \left[\dfrac{3x^2}{2} - \dfrac{x^3}{3} \right]_{-2}^{3}$

$= \dfrac{2}{25} \cdot \dfrac{-25}{6} = -\dfrac{1}{3}$

$V(x) = E(x^2) - [E(x)]^2$

$= \dfrac{3}{2} - \left(\dfrac{-1}{3}\right)^2 = \dfrac{3}{2} - \dfrac{1}{9} = \dfrac{25}{18}$

$E(x^2) = \int x^2 g(x) \, dx$

$= \dfrac{2}{25} \int_{-2}^{3} \left[\dfrac{3x^3}{3} - \dfrac{x^4}{4} \right]_{-2}^{3}$

$= \dfrac{2}{25} \cdot \dfrac{75}{4} = \dfrac{3}{2}$

$$E(Y) = \int y\, h(y)\, dy$$

$$= \int_4^6 \frac{y^2}{10}\, dy$$

$$= \frac{1}{30}\, y^3 \Big]_4^6$$

$$= \frac{76}{15}$$

$$E(Y^2) = \int_4^6 y^2 \cdot \frac{y}{10}\, dy$$

$$= \frac{1}{40} \cdot y^4 \Big]_4^6$$

$$= 26$$

$$\therefore V(Y) = 26 - \left(\frac{76}{15}\right)^2 = \frac{74}{225} = 0.329$$

g)

$$\mathrm{Cov}(XY) = E(XY) - E(X)E(Y)$$

$$E(X.Y) = \iint xy\, f(xy)\, dx\, dy$$

$$= \int_4^6 \int_{-2}^{3} xy \cdot \frac{1}{125}(3-x)y\, dx\, dy$$

$$= \frac{1}{125} \int_4^6 y^2 \left[\frac{3x^2}{2} - \frac{x^3}{3}\right]_{-2}^{3} dy$$

$$= -\frac{1}{30} \int_4^6 y^2\, dy$$

$$= -\frac{1}{30}\, \frac{y^3}{3} \Big]_4^6 = -\frac{76}{45}$$

$\therefore \operatorname{Cov}(xy) = E(xy) - E(x)E(y)$

$$= -\frac{76}{45} + \frac{76}{45} = 0$$

h)

$$\operatorname{Corr}(x,y) = \frac{0}{\cdots} = 0$$

* if, X & Y are independent then,

$$E(x,y) = E(x)E(y)$$

$$\operatorname{Cov}(xy) = 0$$

$$\operatorname{Corr}(xy) = 0$$

L-10/27.08.2023/

Quiz-1

L-11/29.08.2023/

* marginal distribution of X

X	1	2	3	4
P(X)	0.21	0.24	0.30	0.25

* marginal distribution of Y

Y	1	2	3
P(Y)	0.32	0.57	0.11

* Expected value of X:

$$E(X) = \Sigma x \cdot P(x)$$

$$= 0.21 + 2 \cdot 0.24 + 3 \cdot 0.30 + 4 \cdot 0.25$$

$$= 2.59$$

$$V(X) = E(X^2) - [E(X)]^2 = 7.87 - (2.59)^2$$

$$= 1.1619$$

$E(x^2) = \sum x^2 p(x)$

$= 1^2 \cdot 0.21 + 2 \cdot 0.24 + 3^2 \cdot 0.30 + 4^2 \cdot 0.25$

$= 7.87$

⊛ $P[X \mid Y=3] = \dfrac{P(X,3)}{P(Y=3)}$

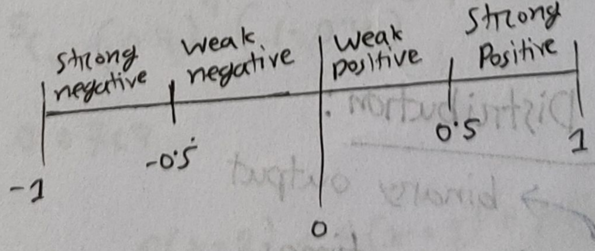
⊛ $P[X=1 \mid Y=3] = \dfrac{P(1,3)}{P(Y=3)} = \dfrac{0.01}{0.11} = 0.091$

⊛ The conditional distribution of the service time X,

X	1	2	3	4
$P(X \mid Y=3)$	0.091	0.091	0.182	0.636

$E(X,Y) = \sum X \cdot Y \cdot P(X,Y)$

$= 4.86$



L-12/03.09.2023/

Like binary, two outcome, success and failure

Bernoulli Distribution:

$X = 1, 0$

$$\left.\begin{aligned} P(X=1) &= P \\ P(X=0) &= 1-P \end{aligned}\right\} \text{total} = 1$$

$$f(x) = p^x (1-p)^{1-x} \;;\; x = 0,1$$

$x = 0,$

$$\left.\begin{aligned} f(0) &= p^0 (1-p)^1 \\ &= 1-p \\ f(1) &= p(1-p)^0 \\ &= p \end{aligned}\right\} \begin{aligned} \text{total} &= 1-p+p \\ &= 1 \end{aligned}$$

$E(X) = P$

$V(X) = P(1-P)$

⊛ Binomial Distribution:

Toss a coin in n times

binary output

x → number of success ~~in~~ in n trials.

x = 0, 1, 2, ..., n

Disereate random variable.

The probability distribution of x is called Binomial Distribution.

$$f(x, n, p) = \begin{cases} {}^{n}C_{x}\, p^{x}(1-p)^{n-x} & ; \quad x = 0, 1, 2, \ldots, n \\ 0 & ; \quad \text{otherwise} \end{cases}$$

$E(x) = np$

$v(x) = np(1-p)$

$P(G) = 0.4$ Baby born, $n = 5$

$P(B) = 0.6$ Probability of 4n Girl = ?

$$P(x=4) = {}^{5}C_{4}\,(0.4)^{4}\,(1-0.4)^{5-4}$$

$$= 0.0768$$

at least 2

$$P(x \geq 2) = P(x=2) + P(x=3) + P(x=4) + P(x=5)$$

$$= 0.3456 + 0.2304 + 0.0768 + 0.01024$$

$$= 0.66304$$

$$= 1 - P(x=0) - P(x=1)$$

L-13/05.09.2023

⊛ Slide Question:

a) $P(X=x) = {}^{20}C_x \, p^x (1-p)^{20-x}$; $x = 0, 1, 2, \dots, 20$

$= {}^{20}C_x (0.261)^x (1-0.261)^{20-x}$

b) $E(x) = np = 20 \cdot 0.261 = 5.22$

$V(x) = np(1-p) = 5.2(1-0.261) = 3.857$

c) $P(X=7) = {}^{20}C_7 (0.261)^7 (1-0.261)^{20-7}$

$= 0.125$

d) $P(X \leq 3) = P(X=0) + P(X=1) + P(X=2) + P(X=3)$

e) $P(X \geq 2) = 1 - P(X=0) - P(X=1)$

⊛ Geometric Distribution:

$P(X=x) = (1-p)^{x-1} p$; $x = 1, 2, 3, \dots$

$E(x) = \frac{1}{p}$

$V(x) = \frac{1-p}{p^2}$

⊛ ~~Binominal~~ Bernoulli Distribution

$$P(X=x) = {}^{x-1}C_{r-1} \, (1-p)^{x-r} \, p^{r}$$

$$E(x) = \frac{r}{p}$$

$$V(x) = \frac{r(1-p)}{p^2}$$

L-14 / 10.09.2023 /

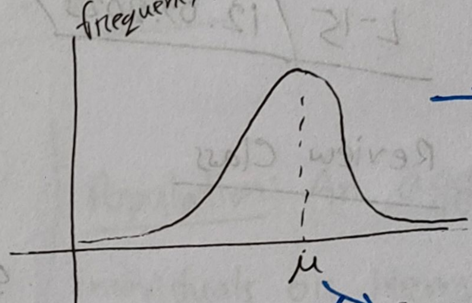
⊛ Normal Distribution

$$f(x;\mu,\sigma^2) = f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\left(\frac{x-\mu}{2\sigma}\right)^2} \quad \left\} \begin{array}{l} -\infty < x < x \\ -\infty < \mu < \infty \\ 0 < \sigma^2 < \infty \end{array} \right.$$

$E(X) = \mu$

$V(X) = \sigma^2$

$SD = \sigma$



→ Symetric Distribution

$X \to$ r.v.

μ → average/mean

→ mean = mode = medium

⊛ Standard normal distribution

$\mu = 0$

$\sigma = 1$

$$f(z) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}z^2}$$

$E(z) = 0$

$V(z) = 1$

$$z = \frac{x-\mu}{\sigma}$$

Example

(i)

$P(x < 10.5)$

$= P\left(\frac{x-\mu}{\sigma} < \frac{10.5-\mu}{\sigma}\right)$

$= P\left[z < \frac{10.5-11}{0.3}\right]$

$= P[z < -1.67]$

$= F[-1.67]$

$= 0.0475$

(ii) $P[10 < x < 12]$

$= P\left[\frac{10-\mu}{\sigma} < \frac{x-\mu}{\sigma} < \frac{12-\mu}{\sigma}\right]$

$= P\left[\frac{10-11}{0.3} < z < \frac{12-11}{0.3}\right]$

$= P[-3.33 < z < 3.33]$

$= F(3.33) - F(-3.33)$

$= P(z < 3.33) - P(z < -3.33)$

$= 0.9996 - 0.00043$

$= 0.99917$

L-15 / 12.09.2023 /

Review Class

$\boxed{\text{L1-11}} \rightarrow$ 5 out of 6

70 minutes $\rightarrow$ All Text type Question

Example

(i) $P[x > 3.2]$

$= P\left[\frac{x-\mu}{\sigma} > \frac{3.2-\mu}{\sigma}\right]$

$= P\left[z > \frac{3.2-3}{0.12}\right]$

$= P[z > 1.67]$

$= 1 - P[z < 1.67]$

$= 1 - 0.9525$

$= 0.047$

(ii) $P[x < 2.7]$

$= P[Z < -2.5]$

$= P[Z > 2.5]$

$= 1 - P[Z < 2.5]$

$= 1 - 0.9938$

$= 0.062$

⊛ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

L-16 / 17.09.2023 /

Midterm Exam

L-17 / 17.09.2023 /

⊛ Descriptive Statistic:

⇒ Population

⇒ Sample

⇒ Data & Variable

⇒ Cental Tendency

⇒ Dispersion

Population: An aggregati of all individuals or items difined on some common characteristic under study is called population.

Sample: A subset of population i.e. representive part of population is known as sample.

L-18 | 24.03.2023 |

~~Scales of~~

Scales of Measurement

- Qualitative
  - Nominal : Unranked Categories
  - Ordinal : Ranked Categories
- Quantitative
  - Interval
  - Ratio

Problem from Slide

Practice Exercise ⇒ Ordinal

College Major ⇒ Nominal

Reaction time ⇒ Ratio

Blood glucose level ⇒ Ratio

Temparature (Low, Medium, High) ⇒ Ordinal

Temperature ⇒ Interval

Monthly Income ⇒ Ratio

Gender ⇒ Nominal

Number of day absent in class ⇒ Ratio

Journal Problem from Slide

(i) Continuous, Ratio

(ii) Qualitative, Nominal

(iii) Qualitative, Ordinal

(iv) Continuous, Ratio

(v) Qualitative, Nominal

Frequency Distribution

Distribution of data in a table, easy to observe data.

⊛ **Construction of table:**

Step-1: Number of classes,

$$K = 1 + 3.322 \log_{10} N$$

total number of data

keep, $5 \leq k \leq 10$

Step-2:

Determine interval,

Highest

$$i \geq \frac{H - L}{k}$$

Lowest