Ex ‘’ 5’’ : If X is a continuous random variable has the probability density function:

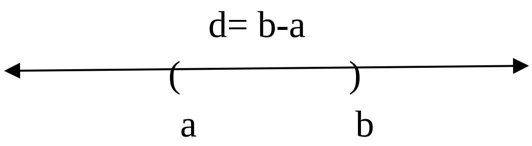
$f(x) = CX(1 - X^2)$, $0 \le x \le 2$

Find : 1-The value of C .

2) . $P(-1 < x < 1)$ H.W

** **Uniform distribution on interval (a,b) :**   التوزيع المنتظم

Given an interval (a ,b) $b > a$



Choose a point x from (a, b) then $a < x < b$

A function $f(x) = \begin{cases} \frac{1}{b-a} & \text{for } a < x < b \end{cases}$

Is called uniform distribution on (a,b)

To show that f(x) a p ,d .f

Cond'' 1' T. P f(x) ≥ 0

$\because$ b-a > 0 since a $>$ b

$\therefore \frac{1}{b-a} > 0$

$\Rightarrow$ f(x)= $\frac{1}{b-a} > 0$ for $a < x < b$

f(x) ≥ 0

Cond ''2' : T. P f(x) $\int_{-\infty}^{\infty} f(x)\ dx = 1$

$\Rightarrow \quad \int_{-\infty}^{\infty} f(x)\ dx = \int_{a}^{b} \frac{1}{b-a}\, dx$

$= \frac{1}{b-a} \int_{a}^{b} dx$

$= \frac{1}{b-a}\, x \Big| = \frac{1}{b-a}\, (b-a)$

$= \frac{1}{b-a}\, (b - a) = 1$

$\therefore$ f(x) is a p .d. f

<u>Ex '' 1'' :</u>

if x has uniform distribution on (-2 , 3)[x ~ unif .(-2 , 3)].

A –find a p. d .f of x

b- find f(x > 0 | $-\frac{1}{2} < x < 2$).

Sol:

A . f(x) = $\begin{cases} \frac{1}{b-a} & , x \sim \text{unif .(-2 , 3)].} \\ \end{cases}$

1) F(x) f(x) ≥ 0

since $\frac{1}{b-a} = \frac{1}{3-(-2)} = \frac{1}{5} \geq 0$

Cond ''2' : T. P f(x) $\int_{-\infty}^{\infty} f(x)\ dx$

2) ⇒ $\int_{-\infty}^{\infty} f(x)\ dx$

$= \int_{-2}^{3} \frac{1}{b-a} dx$

$= \frac{1}{b-a} \int_{a}^{b} dx$

$= \frac{1}{b-a} x = \frac{1}{b-a} (b-a)$

$= \frac{1}{3-(-2)} \quad 3-(-2) = 1$

∴ f(x) is a p .d. f

b) p(x> 0)

Ex '' 2''

Given [x ~ unif .(-1 , 3)

1) find p.d.f of x and find p($0 \leq x \leq 2$)

2) Given f (x) = $\frac{1}{\pi(1+x^2)}$ for $-\infty < x < \infty$. show that f(x) is a p.d f : H.W