SUBHENDU MAJI
18ETCS002121
CSE - 'C' section.

Assignment - 4

Sol. 1.

a) Probability distribution $\sum P(x_i) = 1$
finding k.

$$\frac{2k-3}{10} + \frac{k-2}{10} + \frac{k-1}{10} + \frac{k+1}{10} = 1$$

$$2k-3+k-2+k-1+k+1 = 10$$

$$5k-5 = 10$$

$$5k = 15$$

$$\boxed{k=3}$$

i) $P(-3 < x < 4)$

$\Rightarrow P(-1) + P(2)$

$$\Rightarrow \frac{k-2}{10} + \frac{k-1}{10} = \frac{2k-3}{10} = \frac{2(3)-3}{10}$$

$$= \frac{3}{10} = 0.3$$

ii) $P(X \leq 2)$

$\Rightarrow P(-3) + P(-1) + P(2)$

$$\Rightarrow \frac{2k-3}{10} + \frac{k-2}{10} + \frac{k-1}{10} = \frac{4k-6}{10}$$

$$\Rightarrow \frac{4(3)-6}{10} = \frac{6}{10} = 0.6$$

Soln 2.

$$U(x,y) = e^x \cos(y) + xy$$

$$\frac{\partial U}{\partial x} = \cos y e^x + y \qquad \frac{\partial^2 u}{\partial x^2} = e^x \cos y$$

$$\frac{\partial u}{\partial y} = -\sin e^x + x \qquad \frac{\partial^2 u}{\partial y^2} = -\cos y e^x$$

we know,

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$$

$\therefore$, U is harmonic

let $v(x,y)$ be the imaginary part,

$$f'(z) = \frac{\partial u}{\partial x} - \frac{i\partial v}{\partial y}$$

$$f'(z) = (e^x \cos y + y) - i(-\sin y e^x + x)$$

$$\Rightarrow e^x \cos y + i \sin y e^x + (y - ix)$$

$$\Rightarrow e^{(x+iy)} + (y - ix)$$

By Milne-Thomson method,

Replace x by z and y by 0.

$$f'(z) = e^z - iz$$

Integrating w.r.t z, we get

$$f(z) = \int (e^z - iz)\,dz$$

$$\boxed{f(z) = e^z - i\frac{z^2}{2} + c}$$