Engineering Mathematics – 4

19MHB211A

Tutorial and Assignment – 4

Tutorial-4

1. A coin is tossed thrice. A random variable X represents the number of heads turning up. Find the discrete probability distribution for X. Also find its mean and variance

2. Show that the following distribution represents a discrete probability distribution and hence find its mean and variance:

x	10	20	30	40
p(x)	1/8	3/8	3/8	1/8

3. Find the value of the constant k and the mean and the variance of the following distribution. Also find $(i)P(X > -1)$, $(ii)P(0 < X \leq 3)$, $(iii)P(-2 < X \leq 1)$.

x	-2	-1	0	1	2	3
p(x)	0.1	k	0.2	2k	0.3	k

4. Find the analytic function $f(z)$ whose real part is $u(x,y) = x^3 - 3xy^2$ and also show that u is harmonic.

5. show that $u(x,y) = e^x \cos y + xy$ is harmonic and find the analytic function $f(z)$ whose real part is u.

6. Determine the analytic function $f(z)$ whose real part is $u(x,y) = -e^{-x} \sin y$.

7. Evaluate the following integral along the indicated closed contour(s):

   (a) $\int_C \dfrac{4}{z - 3i} dz;, \quad C : |z| = 5,$

   (b) $\int_C \dfrac{z^2}{z^2 + 4} dz;, \quad C : |z - i| = 2,$

   (c) $\int_C \dfrac{\cos z}{3z - \pi} dz;, \quad C : |z| = 1.1,$

   (d) $\int_C \dfrac{e^{z^2}}{(z + i)^3} dz;, \quad C : |z - i| = 1,$

   (e) $\int_C \dfrac{z}{(z - 1)(z - 2)} dz;, \quad C : |z| = 4, \ |z + 1| = 1.$

Assignment – 4

Question No. 1

A random variable X takes the values $-3, -1, 2$ and 5 with respective probabilities
$\dfrac{2k-3}{10}, \dfrac{k-2}{10}, \dfrac{k-1}{10}$ and $\dfrac{k+1}{10}$.
Determine the value of k and $(i)P(-3 < X < 4)$ $(ii)P(X \le 2)$.   (5 marks)

Question No. 2

Prove that $u(x,y) = e^x \cos(y) + xy$ is harmonic and hence determine the analytic function $f(z)$.
          (5 marks)

Note: Submit the assignment to the respective course leader.