

Assignment - 4

(Maths - II)

Que. 1 If $z = e^u f(v)$ and $u = ax + by$, $v = ax - by$,
show that $b \frac{\partial z}{\partial x} + a \frac{\partial z}{\partial y} = 2abz$.

Que. 2 If $u = \{1 - 2xy + y^2\}^{-1/2}$, prove that

$$\frac{\partial}{\partial x} \left\{ (1 - x^2) \frac{\partial u}{\partial x} \right\} + \frac{\partial}{\partial y} \left\{ y^2 \frac{\partial u}{\partial y} \right\} = 0$$

Que. 3 If $u = \cos^{-1} \left(\frac{x+y}{\sqrt{x} + \sqrt{y}} \right)$, show that :

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = -\frac{1}{2} \cot u$$

Que. 4 If $u = f(r)$, where $r^2 = x^2 + y^2$, then
prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = f''(r) + \frac{1}{r} f'(r)$

Que. 5 Discuss maximum and minimum of function
 $x^3 + y^3 - 6xy$.