Class - 2

Problems on Partial Derivatives

1. If $u = (y - z)(z - x)(x - y)$, then prove that $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial z} = 0$.

2. If $u = \log(\tan x + \tan y + \tan z)$ then show that $\sin 2x \dfrac{\partial u}{\partial x} + \sin 2y \dfrac{\partial u}{\partial y} + \sin 2z \dfrac{\partial u}{\partial z} = 2$

3. If $u = \log \rho$, where $\rho^2 = (x - a)^2 + (y - b)^2 + (z - c)^2$, show that $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} + \dfrac{\partial^2 u}{\partial z^2} = \dfrac{1}{\rho^2}$.

4. If $z = f(y - 3x) + \emptyset(y + 2x) + \sin x - y\cos x$, then prove that $\dfrac{\partial^2 z}{\partial x^2} + \dfrac{\partial^2 z}{\partial x \partial y} - 6\dfrac{\partial^2 z}{\partial y^2} = y\cos x$.

5. At what rate is the area of a rectangle changing if its length is 15mts and increasing at 3mts/sec while its width is 6mts and increasing at 2mts/sec. **Ans:48**