

Answer on Question #74940 – Math - Calculus

Question: Show that the function $u(x,y)=\arctan(y/x)$ is a solution of 2 Dimensional Laplace equation.

Solution: If $u(x,y)$ is a solution of two dimensional Laplace equation for variable x and y then,

$$\frac{\partial^2}{\partial x^2} \left[\arctan \left(\frac{y}{x} \right) \right] + \frac{\partial^2}{\partial y^2} \left[\arctan \left(\frac{y}{x} \right) \right] = 0 \text{ must be zero.}$$

$$\text{Now, } \frac{\partial^2}{\partial x^2} \left[\arctan \left(\frac{y}{x} \right) \right] + \frac{\partial^2}{\partial y^2} \left[\arctan \left(\frac{y}{x} \right) \right] = \frac{2xy}{(x^2+y^2)^2} + \frac{-2xy}{(x^2+y^2)^2} = 0$$

Answer: $u(x,y)=\arctan(y/x)$ is a solution of two dimensional Laplace equation.