Answer on Question #68366 – Math – Differential Equations

Question

Form Partial differential eq. of u=ax+(1-a)y+b

Solution

We have relation

$$u = ax + (1 - a)y + b \qquad (1)$$

Differentiate (1) first with respect to x and then with respect to y

$$\frac{\partial u}{\partial x} = a \quad \text{or} \quad p = a$$

$$\frac{\partial u}{\partial y} = 1 - a \quad \text{or} \quad q = 1 - a$$

Substituting $a = p$ into $q = 1 - a$ we get the required partial equation

$$q = 1 - p,$$

hence

$$p + q = 1$$

or

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

Answer: The required partial equation is

$$p + q = 1$$

or

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