Answer on Question #66336 – Math – Calculus

Question

Show that

2z =(ax+y)^2 + B,

where a, B are arbitrary constants, is a complete integral of

$$px + qy - q^2 = 0$$

Solution

$$px + qy - q^2 = \frac{1}{2}\frac{\partial((a\mathrm{x} + \mathrm{y})^2 + \ \mathrm{B})}{\partial x}x + \frac{1}{2}\frac{\partial((a\mathrm{x} + \mathrm{y})^2 + \ \mathrm{B})}{\partial y}y - \left(\frac{1}{2}\cdot\frac{\partial((a\mathrm{x} + \mathrm{y})^2 + \ \mathrm{B})}{\partial y}\right)^2 =$$

$$= a(ax + y)x + (ax + y)y - (ax + y)^2 \ = a^2x^2 + axy + axy + y^2 - (a^2x^2 + 2axy + y^2) =$$

$$= a^2x^2 - a^2x^2 + 2axy - 2axy + y^2 - y^2 = 0 + 0 + 0 = 0$$