Answer on Question #49497 – Math – Differential Calculus | Equations

Task:

If w={xy/(x^2+y^2) } show that $x\frac{\partial w}{\partial x}+y\frac{\partial w}{\partial y}=0$

Solution:

$$\frac{\partial w}{\partial x}=\frac{y(x^2+y^2)-2x^2y}{(x^2+y^2)^2}$$

$$\frac{\partial w}{\partial y}=\frac{x(x^2+y^2)-2y^2x}{(x^2+y^2)^2}$$

$$x\frac{\partial w}{\partial x}+y\frac{\partial w}{\partial y}=\frac{xy(x^2+y^2)-2x^3y}{(x^2+y^2)^2}+\frac{yx(x^2+y^2)-2y^3x}{(x^2+y^2)^2}=\frac{2yx(x^2+y^2)-2x^3y-2y^3x}{(x^2+y^2)^2}=$$

$$=2xy\frac{(x^2+y^2)-x^2-y^2}{(x^2+y^2)^2}=0$$