Answer on Question #74062 – Math – Differential Equations

$$(2yx^2+4)\frac{dy}{dx}+(2y^2x-3)=0$$

Solution

$$(2yx^2+4)\frac{dy}{dx}+(2y^2x-3)=0$$

$$(2yx^2+4)dy+(2y^2x-3)dx=0$$

Let $P(x,y)=\ 2yx^2+4,\ Q(x,y)=\ 2y^2x-3$

This is an exact equation because

$$\frac{\partial P(x,y)}{\partial x}=\frac{\partial Q(x,y)}{\partial y}=4xy$$

$$\frac{\partial F(x,y)}{\partial x}=2y^2x-3$$

$$\frac{\partial F(x,y)}{\partial y}=2yx^2+4$$

$$\int\frac{\partial F(x,y)}{\partial x}dx=\int(2y^2x-3)dx+\ \varphi(y)$$

$$F(x,y)=x^2y^2-3x+\varphi(y)$$

$$\frac{\partial(x^2y^2-3x+\varphi(y))}{\partial y}=2yx^2+4$$

$$2yx^2+\varphi'(y)=2yx^2+4$$

$$\varphi'(y)=4\ \rightarrow\ \ \varphi(y)=\int 4dy=4y$$

The solution is $F(x,y)=C$

$$x^2y^2-3x+4y=C$$

Answer: $x^2y^2-3x+4y=C$