

## Answer on Question #79726 – Math – Differential Equations

Determine the orthogonal trajectory of families. (illustrate)

### Question

1.

$$x^2 + y^2 + 2ay - 1 = 0$$

### Solution

Differentiate respect to  $x$ :

$$2x + 2yy' + 2ay' = 0$$

$$x + y'(y + a) = 0$$

Substitute  $y'$  to  $(-1/y')$

$$x - \frac{(y + a)}{y'} = 0$$

$$y' = \frac{(y + a)}{x}$$

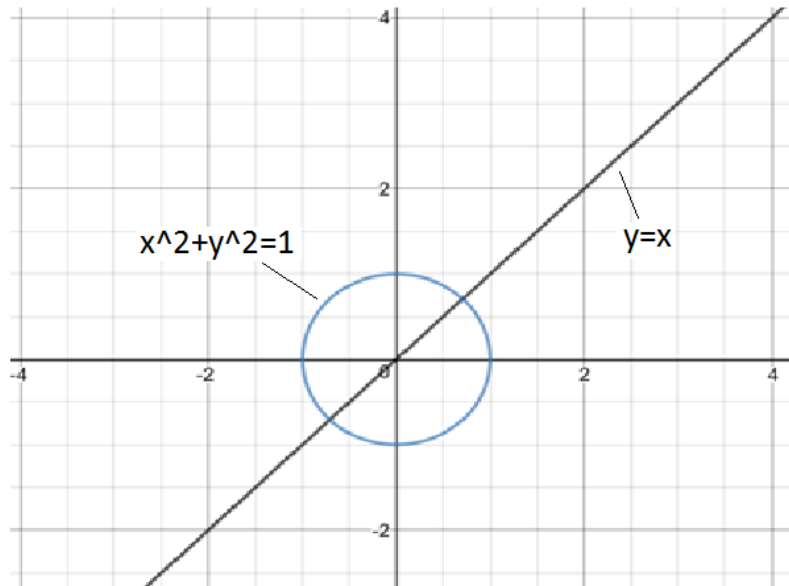
$$\frac{dy}{y + a} = \frac{dx}{x}$$

$$y + a = cx$$

**Answer:**

$$y + a = cx$$

For example: if  $a = 0, c = 1$



2.

**Question**

$$y = ae^{-2x}$$

**Solution**

$$y' = -2ae^{-2x}$$

$$\frac{y}{y'} = -\frac{1}{2}$$

Substitute  $y'$  to  $(-1/y')$ :

$$yy' = \frac{1}{2}$$

$$2ydy = dx$$

$$y^2 = x + c$$

**Answer:**

$$y^2 = x + c$$

For example: if  $a = 1, c = 1$

