

Determine a one-parameter family of solutions of the given differential equation. If an auxiliary condition is provided, determine the corresponding particular solution as well.

1.  $x \sin y \, dx + (x^2 + 1) \cos y \, dy = 0, \quad y(1) = \frac{\pi}{2}$

For this ODE, express the 1-parameter family of solutions *without* using logarithms.

2.  $(y \sec^2 x + \sec x \tan x) \, dx + (\tan x + 2y) \, dy = 0$

3.  $\left(\frac{3-y}{x^2}\right) \, dx + \left(\frac{y^2-2x}{xy^2}\right) \, dy = 0, \quad y(-1) = 2$

4.  $(x+4)(y^2+1) \, dx + y(x^2+3x+2) \, dy = 0$

5.  $8 \cos^2 y \, dx + \csc^2 x \, dy = 0, \quad y\left(\frac{\pi}{12}\right) = \frac{\pi}{4}$

6.  $(2xy+1) \, dx + (x^2+4y) \, dy = 0$