

DIFFERENTIAL EQUATIONS MATH 3D

Midterm Exam 1: answers

Notice that a right answer can be given in many different (but equivalent) forms!

Problem 1.

Find a general solution of the equation

$$xy' + (x + 1)y = 3x^2e^{-x}$$

Answer: $xy = (x^3 + C)e^{-x}$

Problem 2.

Find a general solution of the equation

$$2x^2yy' + y^2 = 2$$

Answer: $y^2 - 2 = Ce^{\frac{1}{x}}$

Problem 3.

Solve the following IVP:

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

Answer: $x^3(1 + \ln y) = y^2$

Problem 4.

Find a general solution of the equation

$$xy' - y = (x + y) \ln \frac{x + y}{x}$$

Answer: $\ln \frac{x+y}{x} = Cx$

Problem 5.

Find a general solution of the equation

$$y = x(y' - x \cos x)$$

Answer: $y = x(C + \sin x)$