Separation of Variables

MATH 211 - 01

1. Find the general solution to the following differential equations.

    a. $\frac{dy}{dx} = \sin(5x)$

    b. $dx + e^{3x}dy = 0$

    c. $x\frac{dy}{dx} = 4y$

    d. $\frac{dy}{dx} = e^{3x+2y}$

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

    f. $\csc y\,dx + \sec^2 x\,dy = 0$

    g. $\sin(3x)dx + 2y\cos^3(3x)dy = 0$

    h. $(e^y + 1)^2 e^{-y}dx + (e^x + 1)^3 e^{-x}dy = 0$

    i. $y' = x\sqrt{1 - y^2}$

    j. $(e^x + e^{-x})y' = y^2$

2. Solve the following initial value problems.

    a. $\frac{dx}{dt} = 4(x^2 + 1),\ x(\pi/4) = 1$

    b. $y' = \frac{y^2-1}{x^2-1},\ y(2) = 2$

    c. $x^2\frac{dy}{dx} = y - xy,\ y(-1) = -1$