R·I·T School of Mathematical Sciences

First Order Linear Equations

MATH 211 - 01

1. Find the general solution to the following differential equations.
   a. $\frac{dy}{dx} = 5y$
   b. $\frac{dy}{dx} + y = e^{3x}$
   c. $y' + 3x^2 y = x^2$
   d. $x^2 y' + xy = 1$
   e. $xy' - y = x^2 \sin x$
   f. $x^2 y' + x(x+2)y = e^x$
   g. $xy' + (1+x)y = e^{-x} \sin(2x)$
   h. $ydx - 4(x + y^6)dy = 0$
   i. $\cos x \frac{dy}{dx} + (\sin x)y = 1$
   j. $(x+2)^2 y' = 5 - 8y - 4xy$
   k. $\frac{dr}{d\theta} = \cos\theta - r\sec\theta$
   l. $(x^2 - 1)y' + 2y = (x+1)^2$
2. Solve the following initial value problems.
   a. $\frac{dy}{dx} = x + 5y$, $y(0) = 3$
   b. $\frac{dy}{dx} = 2x - 3y$, $y(0) = \frac{1}{3}$
   c. $xy' + y = e^x$, $y(1) = 2$
   d. $y' + (\tan x)y = \cos^2 x$, $y(0) = -1$