Problem 1: Find the general solution of the given differential equation
a) \(2y' + y = 3t\)
b) \(y' + (1/t)y = 3\cos 2t\)
c) \((1 + t^2)y' + 4ty = (1 + t^2)^{-2}\)

Problem 2: Solve the initial value problem
a) \(y' + 2y = te^{-2t}, \quad y(1) = 0\)
b) \(y' + (2/t)y = (\cos t)/t^2, \quad y(\pi) = 0\)

Problem 3: Find the value \(y_0\) for which the solution of the initial value problem remains finite as \(t \to \infty\):
\[y' - y = 1 + 3\sin t, \quad y(0) = y_0\]

Problem 4: Construct a first order linear differential equation whose solutions are asymptotic to the line \(y = 2t - 5\) as \(t \to \infty\).
(Hint: First construct a function \(y = y(t)\) with the given property, then find the corresponding differential equation.)