Ordinary Differential Equations

Problem Set I

1. Find the general solution of the ODEs:

   (a) $\dfrac{dx}{dt} = t^3 + \cos t$.

   (b) $\dfrac{dx}{dt} = -2x$.

   (c) $\dfrac{dx}{dt} = x^2$.

   (d) $\dfrac{dx}{dt} = x(1 - x)$.

   (e) $\dfrac{dx}{dt} = x(1 - x) - c$, where c is a constant.

   (f) $\dfrac{dx}{dt} = e^x \sin t$.

   (g) $\dfrac{dx}{dt} = (1 + x^2)t$.

2. Solve: $\dfrac{dx}{dt} = -\dfrac{2t}{1 + t^2}x + 1$, with the initial condition: $x(0) = 1$.