Differential Equations I for Students of Engineering Sciences

Exercise 2

Problem 1: Solve the following initial value problem:

 $y'(x) - 2y(x) = 1 + 4e^{-2x}, \qquad y(0) = 1.$

Problem 2: Use the method of separation of variables to solve the following equations:

(a)
$$y' = x^2 y$$
, (b) $y' = xy^2$, (c) $y' = (1 - \sin(x))y$, (d) $y' = \frac{x \cos^2(y)}{1 + x^2}$.

Problem 3: Solve the following initial value problem for the *Bernoulli* differential equation:

 $u' = \frac{1}{3}u + \frac{1}{3}u^4$ for t > 0, u(0) = 1.

Is the solution defined for all t > 0?