Math 257/316 Assignment 1

Due Friday Jan 16 in class

Problem 1. Find the solution to the initial value problem for the ODE

$$\frac{dy}{dx} = \frac{1+y}{1+x}$$

for each of the initial conditions (a) $y(0) = 1$, (b) $y(0) = -1$, (c) $y(0) = -2$

Problem 2. Find the general solutions to:

(a) $y'' - 2y = 0$

(b) $y'' + y' - 6y = 0$

(c) $y'' + 2y' + y = 0$

Problem 3. Find the solutions to the initial value problems:

(a) $y'' + 9y = 0, \quad y(0) = 1, y'(0) = 6$

(b) $y'' - 2y' + 5y = 0, \quad y(0) = 1, y'(0) = 7$

(c) $x^2y'' + 6xy' + 6y = 0, \quad y(1) = 0, y'(1) = 1$

Problem 4. Find the first six non-zero terms in the power series $y = \sum_{n=0}^{\infty} a_n x^n$ of the general solution of the second-order, linear, homogeneous ODE:

$$(x^2 - 1)y'' + 3xy' + y = 0$$