Math 3280 Assignment 1, due September 2nd.

(1) Read sections 1.1 and 1.2 in the text (Edwards and Penney).

(2) Verify that the given function $y(x)$ is a solution to the differential equation by substitution for each of the problems below.

(a) $y' = 4x^3$, $y = x^4 + 27$. (b) $y' = -3y$, $y = 2e^{-3x}$.

(3) Find all solutions of the form $y = e^{rx}$ to the differential equations below by substitution (here r is a real constant).

(a) $3y'' - 4y' - 4y = 0$. (b) $4y'' = y$.

(4) Determine a value of the constant C so that the given solution of the differential equation satisfies the initial condition.

(a) $y = \ln(x + C)$ solves $e^y y' = 1, \quad y(0) = 1$.
(b) $y = Ce^{-x} + x - 1$ solves $y' = x - y, \quad y(0) = 3$.

(5) Write a differential equation for a population P that is changing in time (t) such that the rate of change is proportional to the square root of P.

(6) Solve the following initial value problems.

(a) $\frac{dy}{dx} = 3x + 1, \quad y(0) = 1$. (b) $\frac{dy}{dx} = \sqrt{x}, \quad y(9) = 0$.

(c) $\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}, \quad y(0) = 0$. (d) $\frac{dy}{dx} = xe^{-x}, \quad y(0) = 2$.