(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) \( y' = 4x^3, \ y = x^4 + 27 \).  \hspace{1cm} (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) \( 3y'' - 4y' - 4y = 0 \).  \hspace{1cm} (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 \( e^y y' = 1 \), \( y(0) = 1 \).  \hspace{1cm} (b) \( y = Ce^{-x} + x - 1 \) solves \( y' = x - y \), \( y(0) = 3 \).

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

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