## Written Homework 1

Recommended textbook problems (do not submit — see detailed solutions on Canvas): Textbook Sec 1.1: problems 5, 14, 22, 32, 42; Sec 1.2: problems 2, 9, 18, 30, 40

There are three required exercises total. Textbook references: Section 1.1 and 1.2.

## Exercise 1

(a) Verify that the function  $y(x) = x + Cx^{-2}$  is a solution of the differential equation xy' + 2y = 3x(by substituting y(x) and y'(x) into the differential equation).

(b) In addition, find the value of C so that we have y(1) = 5.

## Exercise 2

Find a function y = f(x) that satisfies the initial value problem

$$y' = (2+5x)e^{(\frac{x}{3})}, y(0) = 5.$$

*Hint:* integration by parts.

## Exercise 3

A ball of mass 4 kg is thrown upward from the ground with a velocity of v = 30m/s on Mars, where the acceleration of the gravity is g = -3.7m/s<sup>2</sup>.

- (a) How long is the ball in the air on Mars?
- (b) How much longer is the ball in the air on Mars than on Earth, where  $g = -9.8 \text{m/s}^2$ ?

*Hint:* See Sec 1.2 "Velocity and Acceleration" and Example 3.