
Assignment 5

Q1

- Use **DSolve[]** to obtain the analytical solutions for the following first order differential equations using the given boundary conditions. Print out the analytical expressions of these solutions. Plot the solutions.

$$(i) \frac{dv_y}{dt} = -g, v_y(0) = 0$$

$$(ii) \frac{dy}{dt} = -v_y, y(0) = 0$$

Note that v_y that appears in (ii) has to be first obtained from (i)

Q2

Use **DSolve[]** to obtain the analytical solutions for the following first order differential equations using the given boundary conditions. Print out the analytical expressions of these solutions. Assure that your solution agrees with the known one. Plot the solutions

$$m \frac{dv}{dx} = -kx$$

The solution is

$$v(x) = v_0 + \frac{kx_0^2}{2} m - \frac{k}{2m} x^2$$

boundary condition: $v = v_0$ at $x = x_0$

Q3

- Use **DSolve**[] to obtain the analytical solutions for the following first order differential equations using the given boundary condition. Plot your solutions.
- (i) $\frac{dy}{dx} = y - x, y(0) = 2/3$
- (ii) $\frac{dy}{dx} = y - x, y(1) = 1$
- (iii) $\frac{di}{dt} + \frac{R}{L} = \frac{V}{L}, i(0) = -\frac{V}{R}, L = R = 1.$