Assignment 6

Assume the following conditions:

$$\theta(t=0) = 0, \frac{d\theta}{dt}(t=0) = 0, F_0 = m = l = 1. \, g = 9.81,$$
$$\xi = 0$$

(i) Plot the solutions $\theta(t)$ for a forced, damped oscillator on the same graph for t running from 0 to $10T$, where $T = 2\pi\omega_0$, for $\Omega_{\mathrm{D}} = 0.01\omega_0$, $0.5\omega_0$, $0.99\omega_0$, $1.5\omega_0$, $4\omega_0$.

(ii) Repeat (i) for $\xi = 1/\sqrt{2}$

Assignment

For a freely falling object subjected to a frictional coefficient η, the equation of motion is

$$m\frac{d^2y}{dt^2} = -mg - \eta\frac{dy}{dt}.$$

Solve this second order DE using $\mathbf{DSolve[\ ]}$, assume
$$y(t = 0) = 0, v_y(t = 0) = 0, m = 1, g = 9.81.$$

Plot the solutions $y(t)$ for $\eta = 0.1, 0.2, 0.5$ on the same graph. Your plots should be adjusted such that terminal velocities in the solutions can be clearly displayed.