3.2.1 Develop a computer program to solve the equation

$$2\ddot{x} + 4\dot{x} + 4x = 2, \tag{3.12.1}$$

where $\dot{x}(0) = 0$ and $x(0) = 0$. What is the steady-state value of x?

3.2.2 Develop a computer program to solve the equation

$$\dddot{x} + 2\ddot{x} + 2\dot{x} + x = -3, \tag{3.12.2}$$

where $\ddot{x}(0) = \dot{x}(0) = 0$ and $x(0) = 1$. Determine X_{ss}.

3.2.3 Develop a computer program to solve the equation

$$\ddddot{x} + 3\ddot{x} + 2\dot{x} + 4x = 2, \tag{3.12.3}$$

where $\dddot{x}(0) = 0$, $\ddot{x}(0) = 1$, $\dot{x}(0) = 4$ and $x(0) = -3$.

3.2.4 Develop a computer program to solve

$$\ddot{x} + 2\dot{x} - 3x = 3 \tag{3.12.4}$$

where $\dot{x}(0) = x(0) = 0$. Comment on the expected response.

~~3.4.1 Use the summing integrator to develop a program~~

~~negative damping?~~

3.6.3 (a) Develop a program to solve the equation

$$\ddot{x} + \omega_n^2 x = 0, \tag{3.12.5}$$

with $\dot{x}(0) = 0$, $x(0) = 5$ and $\omega_n = 2.0$.

(b) Patch and run the problem on an analog computer and compare the results with an analytical solution.

(c) Repeat part (b) with $\omega_n = 4.0$.

with zero initial conditions.

3.9.2 Develop a program to solve the simultaneous differential equations

$$\ddot{x} + 2\dot{x} + 3\dot{y} + 4x = \cancel{2.0}, 1.0 \tag{3.12.8}$$

and

$$\ddot{y} + 4\dot{y} + 5y + 2x = 0, \tag{3.12.9}$$

with $\dot{x}(0) = 0$, $\dot{y}(0) = 0$, $x(0)$ and $y(0) = \cancel{2.0}$ 1.0

3.9.3 Patch the program of Problem 3.9.2 on a computer

~~3.2.8.~~

5.3.1 Develop a program to simulate the spring-mass-damper problem of Section 5.3 if the spring constant, K, is 0.9 Nt/M for positive deflections and 1.5 Nt/M for negative deflections (i.e., K = 0.9 Nt/M for $x>0$ and K = 1.5 Nt/M for $x<0$).

~~5.3.2 Solve the problem if the mass is changed to 100 Kg. Discuss scaling and the effect of operating levels~~