Homework 3
EE 313 Signals and Systems (Fall 2024)
Wednesday, September 25, 2024

1) 2.21b- Let the input voltage be $x(t)$. Put I/O differential equation in form

$$\frac{d^N y(t)}{dt^N} + a_{N-1}\frac{d^{N-1} y(t)}{dt^{N-1}} + \cdots a_0 y(t) = b_0 x(t) + b_1 \frac{dx(t)}{dt} + \cdots b_M \frac{d^M x(t)}{dt^M}.$$

2) 2.22 Modify problem so that the left spring has constant $0.75K$. Hint: Do not forget gravity.

3) 2.26 without part d. Can analytically solve part a using any method. Use the backward difference Euler's approximation in parts b & c and list the I/O difference equation w/ coefficients evaluated in each case. For part e, plot the analytic result (solid line) from part a with the numerical results from part b (dots) and then plot parts a (solid line) & c (dots) on a separate plot. Use a legend on the plots.

4) 2.29ae

5) 2.32

6) Using Matlab, plot $g(t)$ found in part a of 2.32 for $0 \le t \le 20$ s. Then, plot $y(t)$ found in part b of 2.32 for $0 \le t \le 20$ s.

For problems that involve the use of MATLAB, include both m-file(s) (put your name in a comment line) as well as output figures (put your name in title), preferably on same page (e.g., cut-n-paste into MS-Word before printing), for each problem and/or problem section.

Due Monday, September 30, 2024