ECE 461 - Homework #10

z-Transform, Converting G(s) to G(z). Due Monday, November 16th

1a) What is the difference equation the following transfer function represents?

$$Y = \left(\frac{0.01\left(z^2+1.3z+0.4\right)}{z^3-3.2z^2+1.7z-0.62} \right) X$$

1b) Write a program to implement this filter.

2a) What is the difference equation the following transfer function represents?

$$Y = \left(\frac{0.03(z+1)(z+0.8)(z+0.6)}{z(z-0.9)(z-0.4)(z-0.2)} \right) X$$

2b) Write a program to implement this filter.

Problem 3-6) Assume a sampling rate of 100ms.

- Determine a filter G(z) which has approximately the same step response as G(s)
- Plot the step response of G(z) and G(s) in VisSim (or similar program) to check your answer.

3) $$G(s) = \left(\frac{30}{(s+2)(s+5)} \right)$$

4) $$G(s) = \left(\frac{600}{(s^2+2s+15)(s+20)} \right)$$

5) $$G(s) = \left(\frac{625}{(s+1.31)(s+5.71)(s+12.45)(s+18.37)} \right)$$ (heat equation from HW 5)

6) $$G(s) = \left(\frac{2.5(s+0.25\pm j3.86)}{(s\pm j4.319)(s\pm j1.157)(s+0.25\pm j3.86)} \right)$$ (3-mass system from HW 5)