EEE 304, HW2 **NAME _____**

Problem 1:
Consider the following systems:

1. Transfer function $H(s) = \dfrac{s-10}{(s+1)(s+10)}$ (Continuous time, causal)

2. Transfer function $H(z) = \dfrac{0.1\,z - 0.2}{z^2 - 0.9\,z}$ (Discrete time, causal)

Compute the following:

1. Bode plot (expression, graph)
2. Response to $\sin(2\pi t)$ (for CT) and $\sin(2\pi n/10)$ (for DT)

NOTE:
- The DT system is a discrete approximation of the continuous one with sampling time T = 0.1. The approximation is good up to frequencies ~0.1(Nyquist).

Problem 2:
1. Use forward and backward Euler and Tustin approximations of derivative to derive the DT counterparts of the system of Problem 1.1, for sampling times 0.01, 0.1, 1.

2. Use MATLAB to compare the step responses and frequency responses of the discretizations in P.2.1 with the CT transfer function, and its descretization using the function c2d, with Tustin, zoh and foh options (sample code for a different problem is given below). Briefly, describe your observations.