EEE 304   **HW 1**

Problem 1:

Consider the filter with impulse response $h(t) = e^{-t}u(t - 1) - e^{-2t}u(t)$.

1. Find the transfer function

2. Find the Laplace transform of the output when $x(t) = \sin(t)u(t)$

3. Find the output by taking the inverse Laplace transform of your answer to part 2.

4. Can you obtain the same result using Fourier Transforms?

Problem 2:

Consider the continuous time causal filter with transfer function

$$H(s) = \frac{s}{(s - 1)(s - 2)}$$

1. Compute the response of the filter to $x(t) = u(t)$.

2. Compute the response of the filter to $x(t) = u(-t)$.

3. Repeat parts 1 and 2 for a stable system with the same transfer function.

Problem 3:

Consider the discrete time stable filter with transfer function

$$H(z) = \frac{z}{(z - 0.1)(z - 0.2)}$$

1. Compute the response of the filter to $x[n] = u[n]$.

2. Repeat part 1 for a causal filter with the same transfer function.