CSE 348 Homework. Due: July 1, 2020

Dear Students,
Solving the questions below will prepare you well for the final exam.. Please draw a box around your final resuls.

1) Compute $\tan(i)$ where $i = \sqrt{-1}$.

2) Convolve $\chi_{[0,2]}(t)$ with $tU(t)$. Evaluate the integrals and plot the result.

3) Compute the Fourier transform of $te^{-3t}U(t)$. Hint: Use an integral table to evaluate the integral..

4) Let us have a function $f(t)$ whose Fourier transform is $F(\omega)$. Prove that the Fourier transform of $\frac{d}{dt}f(t)$ is $i\omega F(\omega)$

5) Consider a signal $f(t)$ whose Fourier Transform is $f(\omega) = \chi_{[-100,100]}(\omega)$. We want to sample this signal. What is the lowest rate of sampling we can use if we dont want any aliasing?

6) Filter the signal

$\underline{1}$ 2 4 1
2 0 4 3
1 1 1 1
1 0 4 2

with the filter

1 0 1
0 $\underline{2}$ 0
1 0 1

Use **zero boundary conditions.**