

ECE210 - Homework 13**Due:** Wednesday, December 5, 2018 at 6:00 p.m.

1. For each one of the 4 signals $f(t)$ in parts (a), (b), (c) and (d), do the following

i. Obtain its Laplace transform $\hat{F}(s)$.

ii. Indicate the poles of $\hat{F}(s)$.

iii. Indicate the ROC of $\hat{F}(s)$.

(a) $f(t) = u(t - 6) - u(t + 6)$

(b) $f(t) = te^{2(t-1)}u(t)$

(c) $f(t) = (t - 1)e^{-4t} + \delta(t)$

(d) $f(t) = e^{3t} \cos(t - 1)u(t - 1)$.

2. Determine whether the LTIC systems with the following transfer functions are BIBO stable and explain why or why not.

(a) $\hat{H}_1(s) = 2 + \frac{s}{(s-1)(s+2)}$

(b) $\hat{H}_2(s) = \frac{s^2+5s+6}{(s-1+j5)(s-1-j5)}$

(c) $\hat{H}_3(s) = \frac{s^3+1}{(s+2)(s+4)}$

(d) $\hat{H}_4(s) = \frac{1}{s^2+16}$

(e) $\hat{H}_5(s) = \frac{s-2}{s^2-4}$.

3. For each of the following Laplace transforms $\hat{F}(s)$, determine the inverse Laplace transform $f(t)$,

(a) $\hat{F}(s) = \frac{s+3}{(s+2)(s+4)}$

(b) $\hat{F}(s) = \frac{1}{s(s-5)^2}$

(c) $\hat{F}(s) = \frac{s^2+2s+1}{(s+1)(s+2)}$