

CSE 351 – Signals and Systems, Spring 2022
Homework # 2
Due Date: May 18, 2022 at 17:00 (Hard copy submission to Başak Buluz)
Prof. Dr. Hasari Çelebi

Problems:

1. **[50 points]** Consider a system with the following transfer function,

$$H(s) = (2s+3) / (s^2+5s+6)$$

- a. Determine it's zero-state response if the input $f(t) = e^{-3t} u(t)$.
- b. Write down the differential equation relating output $y(t)$ to the input $f(t)$.
- c. Find the inverse Laplace transform of $(s+2) / s(s+1)^2$.

2. **[30 points]** For a an LTID system with the following differential equation,

$$2y[k+2]-3y[k+1]+y[k] = 4f[k+2]-3f[k-1],$$

Find the output $y[k]$ if the input is $f[k] = (4)^{-k}u[k]$ and initial conditions are $y[-1] = 0$ and $y[-2] = 1$.

3. **[20 points]** Find the inverse z-transform of $z(-5z+22) / (z+1)(z-2)^2$.