CSE 351 – Signals and Systems, Spring 2021
Homework # 1
Due Date: April 12, 2020 at 17:00
Prof. Dr. Hasari Çelebi

Problems:

1. [*20 points]* Determine whether the below systems are linear or non-linear.
   a. $dy/dt + 2y(t) = f^2(t)$
   b. $dy/dt + 3ty(t) = t^2 f(t)$
2. *[40 points]*
   a. For the LTIC system with the below system equation, find the zero-input response ($y_0(t)$) where the initial conditions are $y_0(0) = 2$ and $dy_0(0) / dt = -1$.

      $(D^2+5D+6)\, y(t) = (D+1)\, f(t)$.

   b. For the LTIC system with the unit impulse response of $h(t) = e^{-t}\, u(t)$. Find the zero state response of the system y(t) if input is f(t) = u(t).
3. *[40 points]*
   a. Find the unit impulse response h[k] of the following system: $y[k+1] + 2y[k] = f[k]$.
   b. Determine the zero-state response of the LTID system with the unit impulse response of $h[k] = (-2)^k\, u[k]$ if the input $f[k] = e^{-k}\, u[k]$.