ECE351: Signals and Systems I - Fall 2023 - Dr. Thinh Nguyen
Homework 2
Due 10/11/2023

1. For each following systems, determine whether they are time-invariant? BIBO stable? linear? causal? memoryless? Provide reasons for each answer.
   (a) $y[n] = n^2 x[n]$
   (b) $y[n] = e^{x[n]}$
   (c) $y[n] = x[-n]$
   (d) $y[n] = \sum_{k=n-n_0}^{n+n_0} x[k]$
2. For each following systems, determine whether they are time-invariant? BIBO stable? Linear? Causal? Provide reasons for each answer.
   (a) $y[n] = \sum_{i=-2}^{n-1} (\frac{1}{2})^i x[i+1]$
   (b) $y(t) = \int_{-\infty}^{t} e^{-u+2t} x(u+1) du$
3. A time-discrete system H is described by:

$$y[n] = \sum_{k=0}^{\infty} (0.5)^k x[n-k], \tag{1}$$

   (a) Show that H is an LTI system
   (b) Determine the impulse response $h[n]$.
   (c) Determine whether H is BIBO stable.
4. Exercise 2.3
5. Exercise 2.4
6. Exercise 2.5
7. Excercise 2.6