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) \( y[n] = \sum_{i=-2}^{n-1} \left( \frac{1}{2} \right)^i x[i + 1] \)
   (b) \( y(t) = \int_{-\infty}^{t} e^{-u+2t} x(u + 1) du \)

3. A time-discrete system \( H \) is described by:

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

   (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. Exercise 2.6