Problem Set 2  
Fall 2003

Issued: Monday, September 15, 2003

Due: Monday, September 22, 2003

Reading Assignment: Oppenheim & Schafer: Chapter 3.

Problem 2.1

Oppenheim & Schafer, problem 3.26, parts (a), (b), and (d).

Problem 2.2

Oppenheim & Schafer, problem 3.30.

Problem 2.3

Oppenheim & Schafer, problem 3.32.

Problem 2.4

Oppenheim & Schafer, problem 3.40.

Problem 2.5

Oppenheim & Schafer, problem 3.46.
Problem 2.6

The following information is known about a linear time-invariant system:

(i) the system is causal;

(ii) when the input is

\[ x[n] = -\frac{1}{3} \left( \frac{1}{2} \right)^n u[n] - \frac{4}{3} (2)^n u[-n - 1], \]

then the z-transform of the output is

\[ Y(z) = \frac{1 - z^{-2}}{(1 - \frac{1}{2}z^{-1})(1 - 2z^{-1})}. \]

(a) Find the z-transform of \( x[n] \).

(b) What are the possible choices for the region of convergence of \( Y(z) \)?

(c) What are the possible choices for a linear constant-coefficient difference equation used to describe the system?

(d) What are the possible choices for the impulse response of the system?

Problem 2.7 (optional)

*Oppenheim & Schafer*, problem 3.41.