Problem 1. Oppenheim & Schafer, problem 3.29.

Problem 2. Oppenheim & Schafer, problem 3.44.


Problem 4. If the unilateral z-transform of $x[n]$ is $X(z)$, then show that

$$\lim_{n \to \infty} x[n] = \lim_{z \to 1} (z-1)X(z).$$

When does the limit in (1) exist?

Problem 5. The impulse response of a relaxed linear time-invariant system is

$$h[n] = a^n u[n] \quad |a| < 1.$$ 

Determine the value of the step response (i.e, $x[n] = u[n]$) of the system as $n \to \infty$.

Problem 6. The Fibonacci sequence of integer numbers is obtained by computing each term as the sum of the two previous ones. The first few terms of the sequence are

$$1, 1, 2, 3, 5, 8, \cdots$$

Determine a closed-form expression for the $n$th term of the Fibonacci sequence.