Assignment 1

Kunal Nema

Abstract—**This document contains the solution for Ex. 3.39.a of Discrete-Time Signal Processing by Oppenheim and Wilsky.**

Problem 1. Suppose the z-transform of x[n] is

$$X(z) = \frac{z^{10}}{\left(z-\frac{1}{2}\right)\left(z-\frac{3}{2}\right)^{10}\left(z+\frac{3}{2}\right)^{2}\left(z+\frac{5}{2}\right)\left(z+\frac{7}{2}\right)}$$

It is also known that x[n] is a stable sequence.
(a) Determine the region of convergence of X(z).
Solution: The system is stable.
Thus, ROC includes $|z| = 1$.
Therefore, ROC is $\frac{1}{2} < |z| < \frac{3}{2}$.