Tutorial 8 on Week 9

1. Determine the z transform of

$$x[n] = \left(\frac{1}{5}\right)^n u[n-3]$$

Specify its region of convergence (ROC).

2. Determine the z transform of

$$x[n] = \begin{cases} \left(\frac{1}{3}\right)^n \cos\left(\frac{\pi}{4}n\right), & n \leq 0 \\ 0, & n > 0 \end{cases}$$

Specify its region of convergence (ROC).

3. Determine the discrete-time Fourier transforms (DTFTs) of $x[n] = (0.5)^n u[n]$ and $y[n] = 2^n u[n]$.

4. Determine the z transform of

$$x[n] = (0.5)^n (u[n+5] - u[n-5])$$

   Specify its region of convergence (ROC).

5. Consider the z transform of a discrete-time signal $h[n]$:

$$H(z) = \frac{1 - 2z^{-1}}{(1 + 0.3z^{-1})(1 - 0.5z^{-1})(1 - 0.7z^{-1})(1 + 0.9z^{-1})}$$

   Determine the zero(s) and pole(s) of $H(z)$. Determine all the possible ROCs for $H(z)$.

6. Determine the z transform of

$$x[n] = \begin{cases} 0, & n < 0 \\ n, & 0 \leq n \leq N-1 \\ N, & n \geq N \end{cases}$$

with $N \geq 1$. Specify its ROC.