

Digital Signal Processing Assignment # 6

1. Find the DTFT of the following signals.

(a) $x(n) = a^n [u(n) - u(n - n_0)]$

(b) $x(n) = n \left(\frac{1}{3}\right)^{|n|}$

(c) $x(n) = a^n \cos(\Omega_0 n) u(n), |a| < 1$

(d) $x(n) = (n - 1) a^n u(n), |a| < 1$

2. Find $x(n)$ with DTFT in $0 \leq \Omega \leq 2\pi$ given as follows

(a) $X(\Omega) = -j\pi\delta\left(\Omega - \frac{\pi}{3}\right) + \pi\delta\left(\Omega - \frac{2\pi}{3}\right)$

(b) $X(\Omega) = \frac{4}{[\exp(-j\Omega) - 2]^2}$

3. Find the frequency response of the system described by the following difference equation, and plot the amplitude and phase response with Matlab.

$$y(n) - 0.5y(n - 2) = 2x(n) - x(n - 1) - 0.5x(n - 2) \quad (1)$$