

1. (10 Pts Total) Let

$$x[n] = \frac{n}{2 + n^5},$$

and let $X(e^{j\omega})$ be the Fourier transform of $x[n]$.

- (a) (2 pts) Is $X(e^{j\omega})$ real, purely imaginary, or neither?
 - (b) (2 pts) Is the real part of $X(e^{j\omega})$ even, odd, or neither?
 - (c) (2 pts) Is the imaginary part of $X(e^{j\omega})$ even, odd, or neither?
 - (d) (2 pts) Is $|X(e^{j\omega})|$ even, odd, or neither?
 - (e) (2 pts) Is $\angle X(e^{j\omega})$ (the phase of $X(e^{j\omega})$) even, odd, or neither?
2. (6 Pts Total) Determine the Fourier transform of each of the following signals:
- (a) (2 pts) $x[n] = 5 + 2 \cos(\frac{3\pi n}{7}) + \cos(\frac{6\pi n}{7})$
 - (b) (2 pts) $x[n] = \delta[n] + (1/5)^{|n|}$
 - (c) (2 pts) $x[n] = \frac{\sin(1.5n)}{\pi n}$
3. (4 Pts Total) State precisely the sampling theorem.