Full Name: _____

EEE 5502 (Fall 2022) – Practice **Continuous and Discrete-Time Signals, 2022**

Question #1: Let $x[n] = 2\left(\sum_{k=-\infty}^{\infty} u[n-3k] - u[n-4-3k]\right)$ be a discrete-time signal.

(a) Sketch the signal $x[n]$ for $-6 \leq n < 6$.

(b) Is $x[n]$ an infinite length signal or finite length signal?

(c) Is $x[n]$ signal periodic? If so, determine the fundamental period.

(d) Is $x[n]$ an even signal, odd signal, or neither?

(e) Is $x[n]$ causal, anti-causal, or neither?

(f) Compute the energy and power of $x[n]$ [for *all* time].

Question #2: Let $x[n] = j^{n/123}$ be a discrete-time signal.

(a) Is $x[n]$ an infinite length signal or finite length signal?

(b) Is $x[n]$ signal periodic? If so, determine the fundamental period.

(c) Is $x[n]$ an even signal, odd signal, or neither?

(d) Is $x[n]$ causal, anti-causal, or neither?

(e) Compute the energy and power of $x[n]$ [for *all* time].

Question #3: Answer the following questions.

(a) Let $x_e[n]$ be an even signal and let $x_o[n]$ be an odd signal. Show that

$$x_e[n] = \frac{1}{2}\left(x_e[n] + x_e[-n]\right)$$
$$x_o[n] = \frac{1}{2}\left(x_o[n] - x_o[-n]\right)$$

(b) Let $x_e[n]$ be an even signal and let $x_o[n]$ be an odd signal. Show that

$$\sum_{n=-\infty}^{\infty} x_e[n]x_o[n] = 0\ .$$

(c) Show that $x[n] = \cos(\pi^2 n)$ is not periodic.