PROBLEM:

A second discrete-time system is defined by the input/output relation

$$y[n] = (x[n + 1])^3. \tag{1}$$

(a) Determine whether or not the system defined by (1) is (i) linear; (ii) time-invariant; (iii) causal.

(b) For the system of Equation (1), determine the output $y_1[n]$ when the input is

$$x_1[n] = 2\cos(0.6\pi n) = e^{j0.6\pi n} + e^{-j0.6\pi n}.$$

Express your answer in terms of cosine functions. Do not leave any powers of cosine functions in your answers. Note that this system produces output contain frequencies that are not present in the input signal. Explain how this system might cause "aliasing" of sinusoidal components of the input.

See Problem 6.4 of Problem Set #6, Fall 2000 for a problem like this.