MAE 143A
SIGNALS AND SYSTEMS Prof. M. Krstic

Homework 4

Problem 1. Find the $\mathcal{Z}$ transform of the functions

(a) $y_k = \left(\frac{2}{3}\right)^{k-2} 1_k$

(b) $y_k = \left(\frac{-1}{2}\right)^{k+2} 1_{k-1}$

(c) $y_k = k \left(\frac{1}{2}\right)^{2k} 1_{k-1}$

Problem 2. Compute the *pulse* response of the following systems:

(a) $H(z) = \dfrac{z^{-3}}{z^2 - 1}$

(b) $H(z) = \dfrac{1}{z^2 - 4z + 8}$

Problem 3. Solve the difference equation

$$8y_{k+2} + 2y_{k+1} - y_k = 0, \quad y_0 = 3,\ y_1 = 2\,.$$

Problem 4. Find the solution of the discrete system

$$y_{k+2} + \frac{1}{4} y_k = u_k\,.$$

The input $u_k = 3(\frac{1}{2})^k - 2\delta_k$ for $k = 0, 1, 2, \ldots$ and initial conditions are $y_0 = 2, y_1 = 1$.