

Problem 1: A discrete time system under step input was found to have a closed-loop response

$$\frac{0.4z}{z^3 - 2.2z^2 + 1.9z - 0.7}$$

Find the time ($k=1,2,\dots$) when the time response reaches its first peak by hand, and verified by MATLAB).

Problem 2: consider a unity feedback system with open-loop pulse transfer function $G(z)$ as

$$G(z) = \frac{K}{z(z - 0.2)(z - 0.4)}$$

Where $K > 0$. Determine the values of K for which the closed-loop system is stable using (1) Bilinear transfer & Routh-Hurwitz criteria; (2) Jury criteria; (3) try find the range of K using root locus (either derive manually or using MATLAB rlocus/rlocfind/zgrid commands)