DP5: Design a digital PD controller for the plant whose transfer function is \( \frac{1}{s^2} \). It is desired that the damping ratio \( \xi \) of the dominant closed-loop poles be 0.5 and the natural frequency be 4 rad/s. The sampling period is \( T = 0.1 \) sec.

DP6: Design a digital controller in the \( \zeta \)-plane for the plant whose transfer function is \( \frac{k}{s(s+0.5)} \). The design specifications are:

(i) \( \text{PM} \geq 50^\circ \)

(ii) \( \text{GM} \geq 10 \text{dB} \)

(iii) \( k_v \geq 20 \)

The sampling period is assumed to be 0.1 sec.

DP7: Design a digital controller in the \( \zeta \)-plane for the plant whose transfer function is \( \frac{5}{(s+1)(s+2)} \). The design specifications are:

(i) \( \text{PM} \geq 60^\circ \)

(ii) \( \text{GM} \geq 12 \text{dB} \)

(iii) \( k_v \geq 5 \)

Assume \( T = 0.1 \)