

Problem 1

~~based on the plot we see~~
based on the plot we can see
that any root 0.5 to 1 satisfies
the given conditions

So let $\lambda_d = 0.6$

$$\lambda - 0.6 = 0$$

$$A\lambda^{k+1} - 0.6A\lambda^k = 0$$

$$A\lambda^k = x_k \quad A\lambda^{k+1} = x_{k+1}$$

$$x_{k+1} = 0.6x_k$$

Problem 2

based on the plot any number on
the rise time condition line that
is also within the settling time condition
satisfies the given conditions.

$$\lambda_d = 0.429 \pm 0.496 \pm 0.323$$

$$\lambda^2 - 0.992\lambda + 0.350 = 0$$

Multiply by $A\lambda^{k-1}$

$$A\lambda^{k+1} - 0.992A\lambda^k + 0.350A\lambda^{k-1} = 0$$

$$x_{k+1} = 0.992x_k + 0.350x_{k-1}$$

let $k = 0$

$$x_1 = 0.992x_0 + 0.350x_{-1}$$

$$x_1 = 1.342$$

Problem 3

based on the given condition

$$\lambda d = \pm 0.5i \quad 0.14 \pm 0.5i$$

$$\lambda^2 - 0\lambda + 0.25 = 0$$

Multiply $A\lambda^{k-1}$

$$x_{k+1} = -0.25x_{k-1} \quad x_{k+1} = 0.28x_k + 0.25x_{k-1}$$

let $k=0$

$$x_{k+1} = -0.25x_{k-1} \quad x_1 = 0.28x_0 + 0.25x_{-1}$$

$$x_1 = -0.25 \quad 0.03 \quad 0.53$$

let $k=1$

~~x_2~~