

AAE 364 Control Systems Analysis

Problem Set 2

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Reading Assignment:

Chapter 1 and the class material for the Laplace Transform.

Problems

1. Find the zeros and poles of $F(s)$:

$$F(s) = \frac{2}{1 - e^{-4s}}$$

2. Obtain the Laplace transform of the function defined by

$$\begin{aligned} f(t) &= 0 && \text{for } t < 0 \\ &= 5e^{-0.5t} \sin 2t && \text{for } t \geq 0 \end{aligned}$$

3. Obtain the Laplace transform of the function defined by

$$\begin{aligned} f(t) &= 0 && \text{for } t < 0 \\ &= 3te^{-t} \cos t && \text{for } t \geq 0 \end{aligned}$$

4. Obtain the Laplace transform of the function defined by

$$\begin{aligned} f(t) &= 0 && \text{for } t < 0 \\ &= \sin 2\omega t \cdot \cos 3\omega t && \text{for } t \geq 0 \end{aligned}$$

5. Obtain the Laplace transforms of the following functions:

$$\begin{aligned} f(t) &= 0 && \text{for } t < 0 \\ &= t^2 e^{-2t} && \text{for } t \geq 0 \end{aligned}$$

6. By applying the final-value theorem, find the final value of $f(t)$ whose Laplace transform is given by

$$F(s) = \frac{2}{s(s+5)}$$

7. Given

$$F(s) = \frac{1}{(s+2)^2}$$

determine the values of $f(0+)$ and $\dot{f}(0+)$. (Use the initial-value theorem.)