

CMPE-432. Feedback Control Systems.
Homework #1.*

Spring 2010.

Due date Feb 15, 2010.

Modeling and Laplace based Problems:

Problem 1

Solve the exercise problem of Chapter 2 of “Feedback Control of Dynamic Systems” by “Powell, Franklin” Problem 2.18 on page 68.

Problem 2

Find the Laplace transform $\mathcal{L}(t)$ of the following:

1. $f(t) = t^2 + e^{-3t} \sin \frac{2t}{5}$.
2. $f(t) = \int_0^t \cos(t - \tau) \sin \tau d\tau$.

Problem 3

Find the Inverse Laplace transform $\mathcal{L}^{-1}(t)$ of the following:

1. $F(s) = \frac{e^{-s}}{s^2}$.
2. $F(s) = \frac{3s^2+9s+12}{(s+2)(s^2+5s+11)}$.

Problem 4

Solve the following differential equations using Laplace transform:

1. $\ddot{y}(t) + 2\dot{y}(t) = e^t$, such that $y(0) = 1, \dot{y}(0) = 2$.
2. $\ddot{y}(t) + \dot{y}(t) = t$, such that $y(0) = 1, \dot{y}(0) = -1$.

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Problem 5

Find the transfer function of the following block diagram. Assuming any gain values involved, build this block diagram on SIMULINK.

