

Applied Differential Equations and Modeling

Homework 11

Due in class Tuesday, May 7, 2019

1. Find the inverse Laplace transforms of the given function.

(a) $\frac{3}{s^2 + 4}$

(b) $\frac{2s + 1}{s^2 - 2s + 2}$

(c) $\frac{s^3 - 2s^2 - 6s - 6}{(s^2 + 2s + 2)s^2}$

2. Solve the given initial value problem using the Laplace transform.

(a) $y'' - y' - 6y = 0$
with $y(0) = 1$, $y'(0) = -1$.

Note: on the last homework set, you should have found that

$$Y(s) = \frac{s - 2}{s^2 - s - 6}.$$

(b) $y'' + \omega^2 y = \cos 2t$
for $\omega^2 \neq 4$ with $y(0) = 1$, $y'(0) = 0$.

Note: on the last homework set, you should have found that

$$Y(s) = \frac{s^3 + 5s}{(s^2 + 4)(s^2 + \omega^2)}.$$

(c) $y'''' - 4y = 0$
with $y(0) = 1$, $y'(0) = 0$, $y''(0) = -2$, $y'''(0) = 0$.

Note: on the last homework set, you should have found that

$$Y(s) = \frac{s^3}{s^4 - 4}.$$