MA205 - Integral Calculus
Lesson 50: Analytic Solutions II

Mechanics Based Problems

For the next three problems find the general solution to the given second order differential equation.

1. $2y'' + 5y' + 3y = 0$

2. $y'' + 8y' + 16y = 0$

3. $y'' + 8y' + 41y = 0$

For the next two problems find the particular solution(by hand) to the given second order differential equation by hand.

4. $2y'' + 5y' + 3y = 0, \quad y(0) = 3, \quad y'(0) = -4$

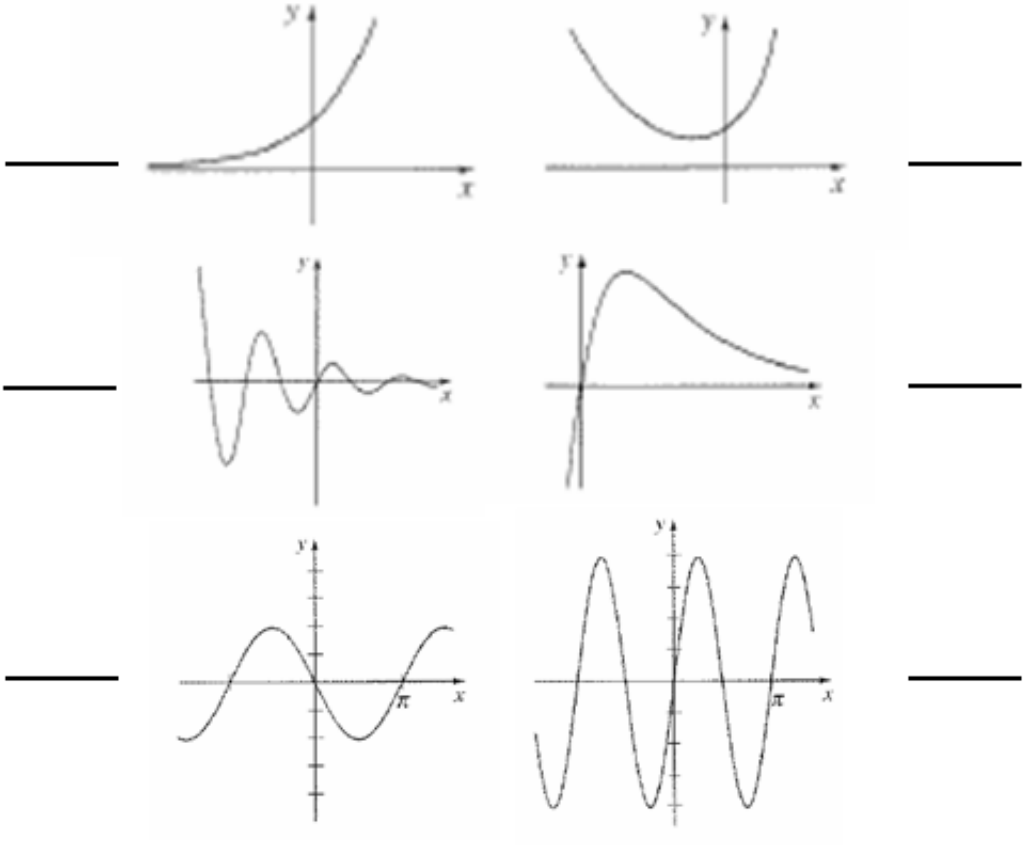
5. $y'' + 16y = 0, \quad y(\pi/4) = -3 \quad , y'(\pi/4) = 4$

6. $y'' + 12y' + 36y = 0, \quad y(1) = 0, \quad y'(1) = 1$

Problem Solving Problems

1. Match the second order differential equations below to a solution curve graph:

a)	$y'' - 3y' - 4y = 0$	*b*)	$y'' + 4y = 0$
c)	$y'' + 2y' + y = 0$	*d*)	$y'' + y = 0$
e)	$y'' + 2y' + 2y = 0$	*e*)	$y'' - 3y' + 2y = 0$



2. Find the necessary value of β so that $2y'' + \beta y' + 6y = 0$

(a) has a solution function that oscillates with constant amplitude.

(b) has a solution function that oscillates with a decaying amplitude.

(c) has a solution function with real and distinct roots.

(d) has a solution function with repeated roots.

3. Given that $y(t) = e^{-5t} - te^{-5t}$ is a particular solution to a second order linear differential equation, what is the differential equation? What are the initial conditions?