Math 274 Quiz 5 **Name:** _____

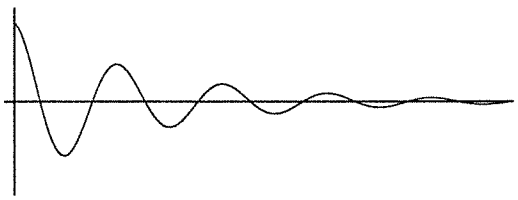
Sections: 4.4-4.5 Point values in $\boxed{\text{boxes}}$.

4 October 2018

1. For $t > 0$, consider the mass spring system

$$x'' + \mu x' + kx = 0. \tag{1}$$

(a) $\boxed{2}$ Let $x(t)$ be a solution to this system with graph below.

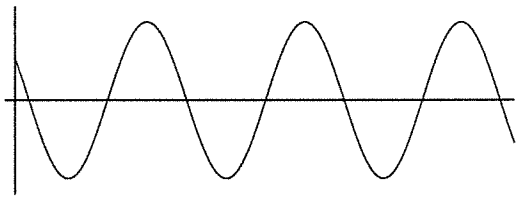


i. Is the system (1) Overdamped, Underdamped, or Undamped.

ii. Which of the following may be solutions to this system?

- $x(t) = 3e^{-t}\cos 4t$
- $x(t) = -4\sin t + 3\cos t$
- $x(t) = 4e^{-3t} - 3e^{-2t}$

(b) $\boxed{2}$ Let $x(t)$ be a solution to this system with graph below.



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2. $\boxed{4}$ Find the solution to the initial value problem

$$y'' + y = 10e^{2t}, \quad y(0) = 2, y'(0) = 2.$$

$y_p = Ae^{2t}$

$y_p'' = 4Ae^{2t}$

Sub. $4Ae^{2t} + Ae^{2t} = 10e^{2t}$

so $A = 2$

$y = C_1 \cos t + C_2 \sin t + 2e^{2t}$

$y(0) = 2 \Rightarrow C_1 = 0$

$y_2' = C_2 \cos t + 4e^{2t}$

$y'(0) = 2 \Rightarrow C_2 = -2$

$y = 2e^{2t} - 2\sin t$