Math 274 Quiz 6 **Name:** _____

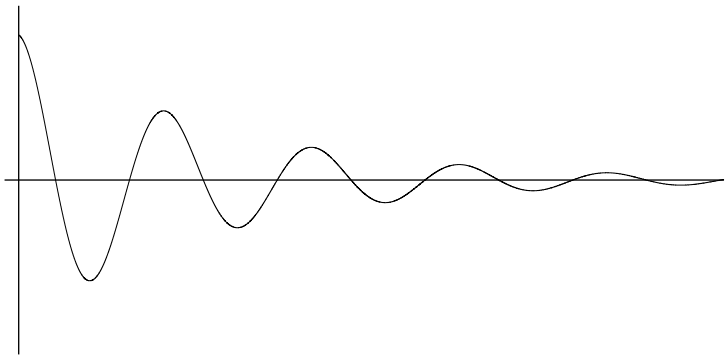
Sections: 4.9, 7.2, 7.3 Point values in boxes.

24 May 2018

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

$$mx'' + bx' + kx = 0.$$

(a) [3] Let $x(t)$ be a solution to this system, and the graph of $x(t)$ below.



Is the quantity $b^2 - 4mk$: Negative, Positive, Zero (circle one).

(b) [3] Which of the functions below could be possible solutions to the system given (a):

- $x(t) = 3e^{-t}\cos(4t)$,
- $x(t) = 4\sin(t) + 5\cos(t)$,
- $x(t) = \frac{1}{2}e^{-2t} + \frac{1}{2}te^{-2t}$.

2. [4] Recall that *hyperbolic cosine* can be defined by

$$\cosh u = \frac{e^u + e^{-u}}{2}.$$

For a a constant, show that

$$\mathscr{L}\{\cosh(at)\} = \frac{s}{s^2 - a^2}.$$