MATH 319, Fall 2013, Assignment 11
Not due

Name (printed): _____

UW Student ID Number: _____

Discussion Section: (circle)

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Instructions

1. Fill out this cover page **completely** and affix it to the front of your submitted assignment.

2. **Staple** your assignment together and answer the questions in the order they appear on the assignment sheet.

3. You are encouraged to collaborate on assignment problems but you must write up your assignment independently. **Copying is strictly forbidden!**

Correctness	
	/20

Completeness	
	/5

Total:	/25
Bonus:	/3

Suggested problems:

Section 7.5: 1-8, 15, 16, 19-27, 29-31
Section 7.6: 1-6, 9, 10, 13-22
Section 7.7: 1-8, 11, 12, 14
Section 7.8: 1-4, 7-10, 13-15
Section 7.9: 1-12

Problems for submission:

Section 7.5: 3, 16, 21
Section 7.6: 9
Section 7.7: 6, 12
Section 7.8: 7(a)
Section 7.9: 5
(Justify your answers for full marks!)

Bonus! Consider the mechanical pendulum/spring system

$$m\frac{d^2x}{dt^2} + c\frac{dx}{dt} + kx(t) = g(t) \tag{1}$$

where $m, c, k \geq 0$.

(a) Convert (1) into a system of first-order differential equations.

(b) Determine the characteristic polynomial for the eigenvalues. How does this expression compare to the polynomial in r obtained by assuming a solution of the form $x(t) = e^{rt}$? (*Hint:* You may assume $g(t) = 0$.)

(c) Suppose that $m = 1$, $c = 0$, $k = 9$, $g(t) = \cos(3t)$, $x(0) = 0$, and $x'(0) = 0$. Determine the solution of the system derived in part (a). (*Hint:* You will need to use the trigonometric identities $\sin(2\theta) = 2\sin(\theta)\cos(\theta)$ and $\cos^2(\theta) = \frac{1}{2}(1 + \cos(2\theta))$ to perform the integration and to simplify the result!)