

Name: _____

Recitation: _____

Math 240
Exam 2
October 21, 2010
(Go Royals)

Problem	Score
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Closed book. You may use a calculator and one $8\frac{1}{2} \times 11$ " sheet of handwritten notes (both sides). You must show your work to receive full credit. Write solutions in explicit form if possible. All problems have a solution that can be found using the techniques of this class.

Pledge:

On my honor, as a student, I have neither given nor received unauthorized aid on this examination: _____

(signature)

(date)

Name: _____

1. Solve the initial value problem $\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 13y = 0$, $y(0) = 2$, $y'(0) = 1$.

Name: _____

2. Find a particular solution to $\frac{d^2 y}{dx^2} + 4\frac{dy}{dx} + 5y = \exp(2x)$.

Name: _____

3. An undamped spring-mass system with a mass of 4kg is observed to have a natural frequency of 2 cycles per second. What is the spring constant?

Name: _____

4. Rewrite $12\cos(9x) + 5\sin(9x)$ in the form $A\cos(9x + \phi)$.

Name: _____

5. Using the improved Euler's method with step size $h = 0.1$, approximate $y(0.2)$ if $\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 10y = 0$, $y(0) = 1$, $y'(0) = 0$.

Name: _____

6. Match the following differential equations with the graphs of their solutions.

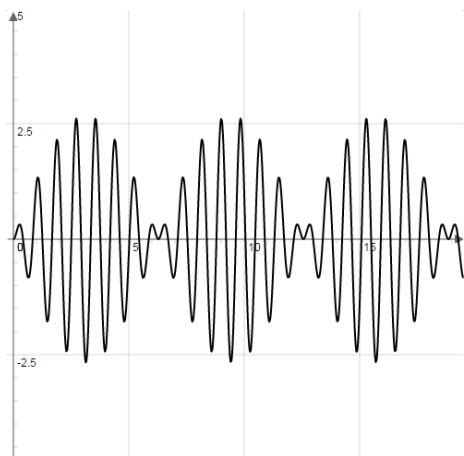
(a) $x'' + 4x = 0$, $x(0) = 0$, $x'(0) = 8$

(b) $x'' + x' + 4x = 0$, $x(0) = 0$, $x'(0) = 8$

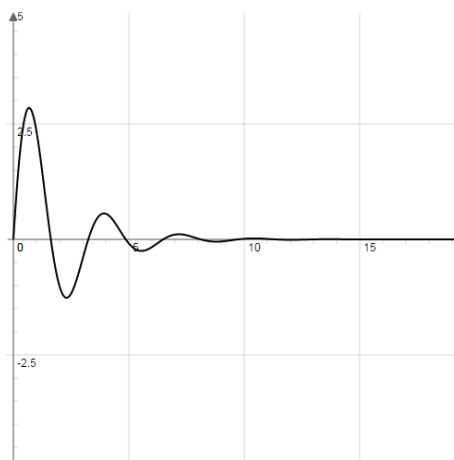
(c) $x'' + 5x' + 4x = 0$, $x(0) = 0$, $x'(0) = 8$

(d) $x'' + 49x = 3\cos(7t)$, $x(0) = 0$, $x'(0) = 0$

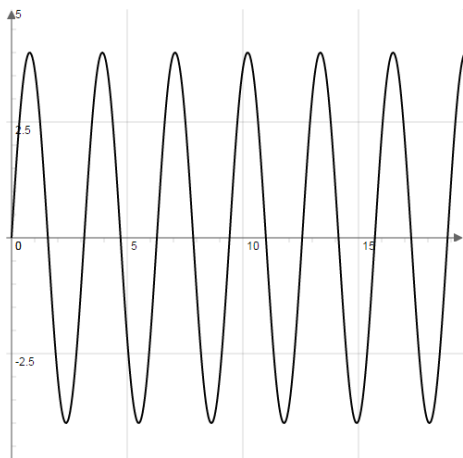
(e) $x'' + 49x = 20\cos(8t)$, $x(0) = 0$, $x'(0) = 0$



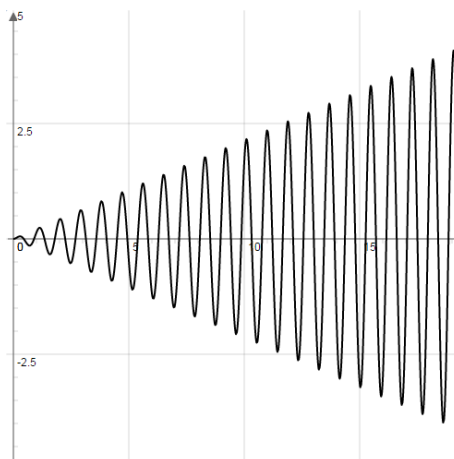
Equation _____



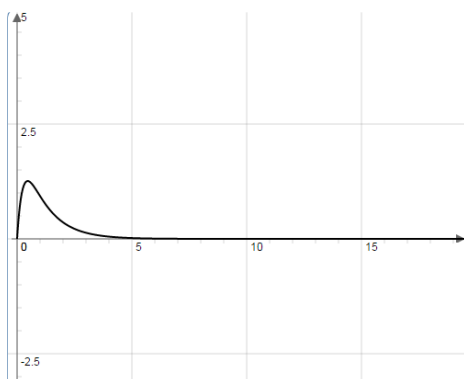
Equation _____



Equation _____



Equation _____



Equation _____

Name: _____

7. Find the general solution to $\frac{d^2y}{dx^2} + 8\frac{dy}{dx} + 12y = \frac{1}{x^2+1}$. Your answer will involve integrals which you can't evaluate.

Name: _____

8.

(a) Give the definition of a linear operator.

(b) Is $Ly = \frac{d^2y}{dx^2} + xy$ a linear operator? Justify your answer.

Name: _____