

Math 252 – Quiz #2

May 9, 2011

Instructor: Patricia Wrean

Name: _____

Total: 25 points

1. Solve the following initial value problem, given that $y(0) = 3$ and $y'(0) = 32$.
(3 points)

$$y'' + 2y' - 24y = 0$$

2. Consider the following differential equations and graphs. (6 points)

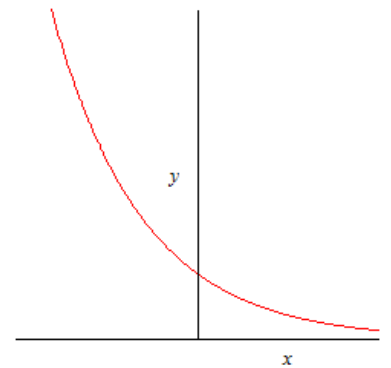
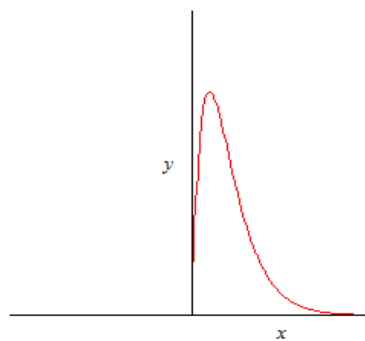
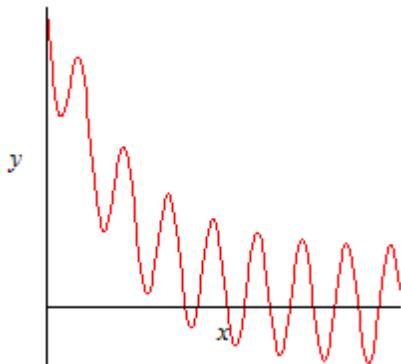
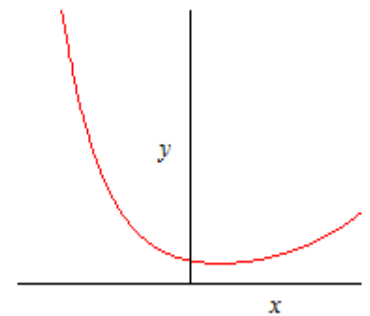
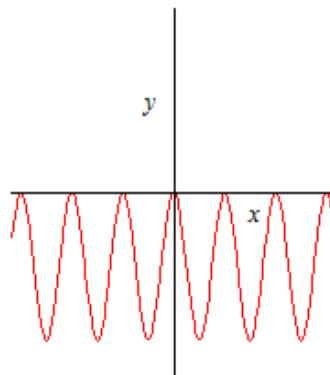
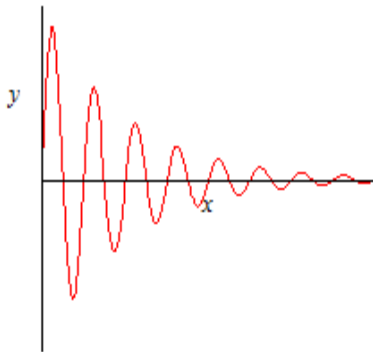
a) For the following DE, give the general solution.

$$y'' + 12y' + 40y = 0$$

b) For the following DE, first state the complementary solution to the associated homogeneous DE. Then give the form of the particular solution to the DE, leaving your answer with undetermined coefficients.

$$y'' - 4y = 3e^{-4x}$$

c) For each DE above, indicate which plot or plots below are possible graphs of the general solution to that DE. No explanation is required. You may pick more than one.



3. Consider the following DE: (5 points)

$$(x-1)y'' - xy' + y = 0$$

- a) Verify that $y_1 = e^x$ is a solution to this DE
b) Find a second solution y_2 , and give the general solution y for this DE.

(Hint: $\frac{x}{x-1} = 1 + \frac{1}{x-1}$.)

4. Solve the following differential equation. (5 points)

$$y'' - 2y' + 2y = x + 10\sin 2x$$

5. An object moving through a fluid has a drag force acting on it which is proportional to its speed. Assume that the drag force is the only unbalanced force acting on the object. If the initial speed of the object is v_0 , (6 points)
- find the object's speed as a function of time t
 - find the magnitude of the object's displacement x as a function of time t
 - calculate $\lim_{t \rightarrow \infty} x(t)$. In real life, what does this limit correspond to?