

Math 217 - August 31, 2010

- Welcome: Syllabus, instructors, TA, policies
- <http://www.dehn.wustl.edu/~blake/m217/>
- Differential equations

1. What is a differential equation?
2. What is an *ordinary* differential equation?
3. What is a *partial* differential equation?
4. What does it mean to *solve* a differential equation?
5. Does every differential equation have a solution?
6. What is an initial value problem?

Lecture Problems

7. Which of the following are solutions to the differential equation

$$\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = 0$$

- (a) $y = 8e^{3x}$
- (b) $y = 8xe^{3x}$
- (c) $y = (3 + 8x)e^{3x}$
- (d) $y = 8e^{-3x}$
- (e) $y = 8xe^{-3x}$
- (f) $y = (3 + 8x)e^{-3x}$

8. Which of the following are solutions to the differential equation

$$\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 9y = 0$$

- (a) $y = 8e^{3x}$
- (b) $y = 8xe^{3x}$
- (c) $y = (3 + 8x)e^{3x}$
- (d) $y = 8e^{-3x}$
- (e) $y = 8xe^{-3x}$
- (f) $y = (3 + 8x)e^{-3x}$

9. Solve the initial value problems

(a)

$$\frac{d^2y}{dx^2} = 6x - 1; \quad y(0) = 2, y'(0) = -11$$

(b)

$$\frac{d^2y}{dx^2} = 6x - 1; \quad y(0) = 0, y'(0) = 0$$

(c)

$$\frac{d^2y}{dx^2} = 6x - 1; \quad y(1) = 0, y'(1) = 0$$

10. What is the *general solution* to

$$\frac{d^2y}{dx^2} = 6x - 1$$