

Unit 11 Outline – Differential Equations and Slope Fields

Monday 3/3	Today's Topic: Sketching Slope Fields
In-Class Examples: Notes Handout	
Homework: None	

Tuesday 3/4	Today's Topic: Reasoning with Slope Fields
In-Class Examples: Notes Handout	
Homework: Worksheet 94	

Wednesday 3/5	Today's Topic: Solving Differential Equations – Separation of Variables
In-Class Examples: Ex. 1 Find the general solution for: <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div>a. $\frac{dy}{dx} = \frac{x}{y}$</div> <div>b. $\frac{dy}{dx} = xy$</div> <div>c. $\frac{dy}{dx} = xe^y$</div> </div> <div style="margin-top: 10px;"> Ex. 2 Solve the initial value problem. a. $y' = -xy, y _{x=0} = 3$ </div>	
AP Multiple Choice The function $y = e^{3x} - 5x + 7$ is a solution to which of the following differential equations? <div style="margin-top: 10px;"> (A) $y'' - 3y' - 15 = 0$ (B) $y'' - 3y' + 15 = 0$ (C) $y'' - y' - 5 = 0$ (D) $y'' - y' + 5 = 0$ </div>	
Homework: Worksheet 95	

In-Class Examples: AP Multiple Choice

Which of the following is the solution to the differential equation $\frac{dy}{dx} = 5y^2$ with the initial condition $y(0) = 3$?

- (A) $y = \sqrt{9e^{5x}}$ (B) $y = \sqrt{\frac{1}{9}e^{5x}}$ (C) $y = \sqrt{e^{5x} + 9}$ (D) $y = \frac{3}{1 - 15x}$ (E) $y = \frac{3}{1 + 15x}$

Which of the following is the solution to the differential equation $\frac{dy}{dx} = \frac{2xy}{x^2 + 1}$ whose graph contains the point $(0, 1)$?

- (A) $y = e^{x^2}$
(B) $y = x^2 + 1$
(C) $y = \ln(x^2 + 1)$
(D) $y = 1 + \ln(x^2 + 1)$
(E) $y = \sqrt{1 + 2\ln(x^2 + 1)}$

A student attempted to solve the differential equation $\frac{dy}{dx} = xy$ with initial condition $y = 2$ when $x = 0$. In which step, if any, does an error first appear?

Step 1: $\int \frac{1}{y} dy = \int x dx$


Step 2: $\ln|y| = \frac{x^2}{2} + C$

Step 3: $|y| = e^{x^2/2} + C$

Step 4: Since $y = 2$ when $x = 0$, $2 = e^0 + C$.

Step 5: $y = e^{x^2/2} + 1$

- (A) Step 2
(B) Step 3
(C) Step 4
(D) Step 5
(E) There is no error in the solution.

Friday 3/7	Today's Topic: Exponential Growth
In-Class Examples: Notes Handout	
AP Multiple Choice  <p>The population P of a city grows according to the differential equation $\frac{dP}{dt} = kP$, where k is a constant and t is measured in years. If the population of the city doubles every 12 years, what is the value of k?</p> <p>(A) 0.058 (B) 0.061 (C) 0.167 (D) 0.693 (E) 8.318</p>	
Homework: Worksheet 97	

Monday 3/10	Today's Topic: Free Response Questions – Slope Fields and Separable Differential Equations
In-Class Examples: None	
Homework: Worksheet 98	

Tuesday 3/11	Today's Topic: Free Response Questions – Slope Fields and Separable Differential Equations
In-Class Examples: None	
Homework: Worksheet 99	

Wednesday 3/12	Today's Topic: Differential Equations/Slope Fields Exam
In-Class Examples: None	
Homework: Unit 11 Exam	