Teacher Notes

A c t i v i t y 1 4

Using Slope Fields

Abstract

This activity contains hints on what to look for when matching a differential equation to its slope field.

Advance Preparation

Load the program **SLPFLD** on the students' graphing handhelds. The program is available in Appendix B at the back of this book or from the TI Web site: **education.ti.com**.

Management Tips and Hints

Prerequisites

- Students should have some idea of what a slope field is and some experience making them by hand.

- Students need some familiarity with the basic language of differential equations, but they need not have studied any specific symbolic techniques of antidifferentiation or separation of variables.

Evidence of Learning

The best assessment items for this activity are matching given slope fields with differential equations and vice versa *without* the use of the graphing handheld.

Common Student Errors/Misconceptions

Students often think that the graph of the expression for $\frac{dy}{dx}$ should fit the slope field represented by $\frac{dy}{dx}$. For example, if $\frac{dy}{dx} = x^2$, students may expect parabolas to fit the slope field instead of cubics.

Extensions

Euler's method is a natural next topic to consider. A listing for an Euler's method program is included in Appendix B at the back of this book or from the TI Web site: **education.ti.com**.

Usage of Program EULER

Enter the expression for $\frac{dy}{dx}$ in **Y1**. The expression can be in terms of x and/or y.

From the home screen, execute the program **EULER**.

The program prompts you for an initial condition, a step size, and a final value for x for which Euler's Method is used to approximate a corresponding y-value. You can choose to show intermediate steps along the way if you wish. The points are stored as a scatter plot that can be displayed using the graphing feature.

Activity Solutions

1. K   u
2. F   w
3. G   r
4. C   x
5. J   q
6. D   m
7. B   v
8. L   o
9. H   n
10. I   p
11. A   t
12. E   s