

Solving Differential Equations Using Euler's Method

by

Mary Ann Connors

Department of Mathematics
Westfield State College
Westfield, MA 01086

Textbook Correlation: Key Topic

- Differential Equations

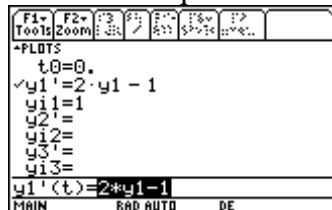
NCTM Principles and Standards:

- Process Standard
 - Representation
 - Connections

Exercises:

Given the initial value problem, $\frac{dy}{dt} = 2y - 1$, $y(0) = 1$, use Euler's Method to approximate the solution over the interval $[0,1]$ with step size = 0.1.

1. Enter the equation



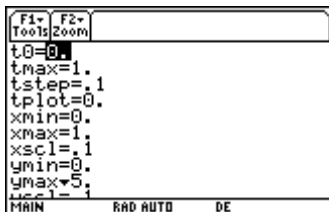
2. Select F1, 9:Format



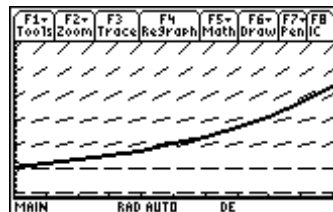
3. Select EULER and SLPFLD



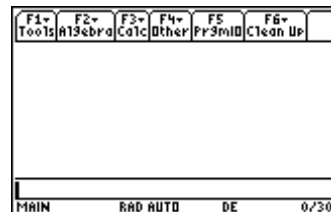
4. Set the WINDOW



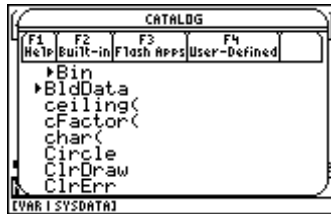
5. GRAPH



6. Go HOME



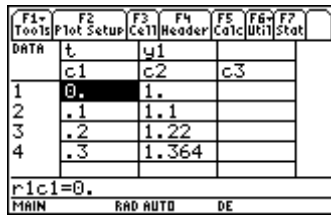
7. In CATALOG select **BldData** and press **ENTER**



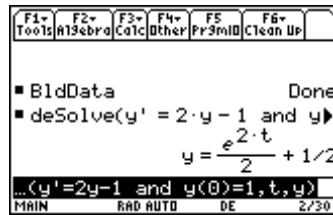
8. Press **APPS**, **6:Data Matrix,1**



9. Look at the data table



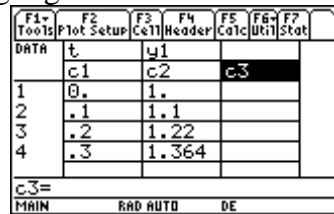
10. **DeSolve** for the solution



11. Return to the current data



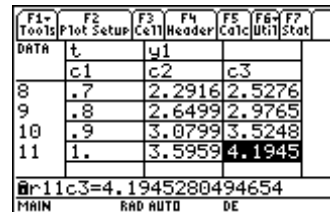
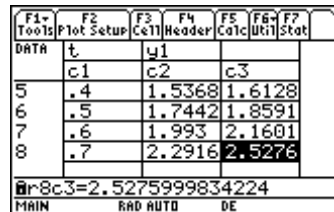
12. Highlight **c3**. Press **ENTER**



13. Type the solution function with c1 for t



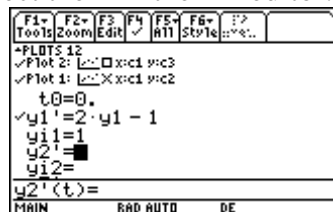
14. Compare the approximate results using Euler's Method in c2 with the analytical solution function values in c3.



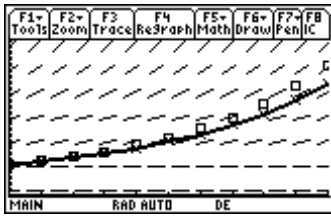
15. **Define** scatter plots for c1 vs c2 and c1 vs c3.



16. Select them in the **Y=** editor.



17. GRAPH.



18. Compute the differences.

F1- Tools	F2- Plot Setup	F3- Cell	F4- Header	F5- Calc	F6- UEI	F7- Stat
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DATA	c1			
	c2	c3	c4	
1	1.	1.	0.	
2	1.1	1.1107	.0107	
3	1.22	1.2459	.02591	
4	1.364	1.4111	.04706	

c4=c3-c2

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