Euler 1
Teacher's Notes

Before beginning this work, discuss and clarify a fundamental point upon which Euler's Method is based. If the rate of change function is constant over an interval, then it is quite easy to find the original function. However, on any interval where the rate of change varies, it becomes much more difficult (at this stage) to find the corresponding function. Though students may not have thought about the problem in these terms, this point will probably be clear when raised in class. Students did not actually find a position function since the "R of C" activity sheets did not use scales on axes, but this notion should still be emphasized. (If this is not obvious at this point, give a couple of specific examples based on speed and distance traveled in a car.)

Go through the example on "Euler 1" slowly and carefully. One suggestion would be to do this work on the board or overhead, eliciting student responses along the way. Be sure to emphasize that the piecewise-constant y' used is actually a rough approximation for the real y'. In fact, it is a really lousy approximation. After this is done, give students the handout for their reference. As with many topics, students will find much of this process quite obvious - until they try to do it themselves. It is highly recommended that students be required to hand in a couple of problems completed in detail. Students should be able to create y' and y, both graphically and analytically, as piecewise-defined functions. Do not proceed until your students can demonstrate their understanding of this process.

A couple of examples are given below. (Clearly, they are easy to create!) The interval [0, 6] is by no means magical. However, it provides fairly small, friendly numbers with $\Delta x \neq 1$, a condition that's a bit too special. Be sure to include a problem with $y(0)$ different from 0 and a $y' < 0$ on one part of the interval.

(1) $y' = 3x + 1$ on $[0, 6]$, $y(0) = 0$

(2) $y' = 2x - 1$ on $[0, 6]$, $y(0) = 0$

(3) $y' = 5x - 2$ on $[0, 6]$, $y(0) = 1$