In Class Exercises (ICE) - 4/10/01

The fastest man in the world is currently Maurice "The Kansas Cannonball" Green (see Figure 1[1]). In 1999, Mr. Green broke the world record in the men's 100m, with a time of 9.79s. Figure 2 shows the velocity-time graph for a race that Mr. Green won at the 1997 World Championships in Athens, Greece.

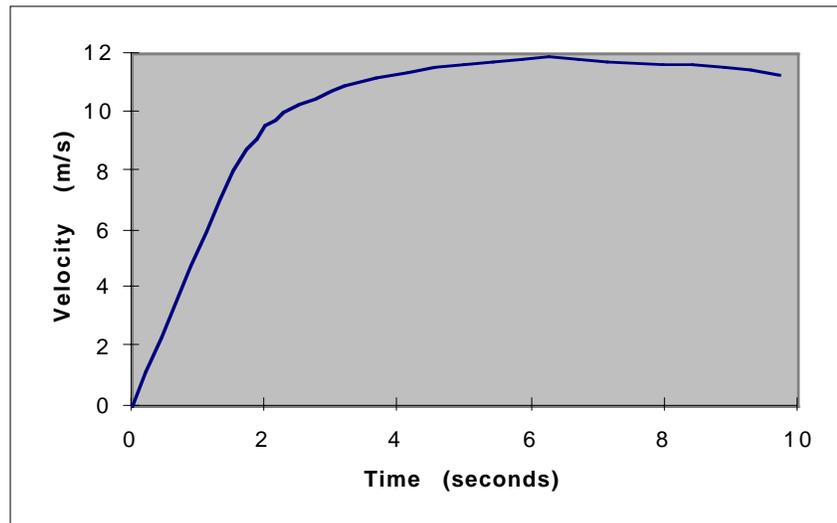Figure 1: Maurice "The Kansas Cannonball" Green

Figure 2: Velocity-time graph for Maurice Green during a race at the 1997 World Championships.

- *Based on the appearance of Figure 2, what athletic event do you think this velocity-time graph represents?*

- *Use your ideas of the relationship between distance traveled, speed and time, along with Figure 2, to check your hunch.*

The graph shown in Figure 2 is quite accurately represented by the function:

$$v(t) = 0.046 \cdot t^3 - 0.925 \cdot t^2 + 5.811 \cdot t + 0.369 .$$

You can use your calculator to approximate[23] the area under a curve, as illustrated in Figures 3 through 8 (below). These instructions apply to a TI-82 or TI-83.
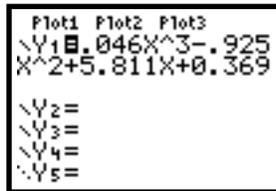
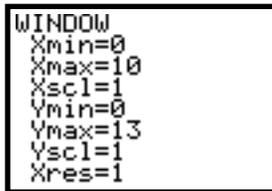Figure 3: Enter the function that you are interested in.

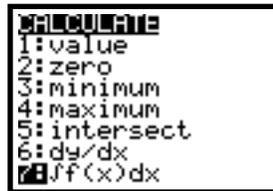Figure 4: Set the viewing window to display the portion of the graph you want.

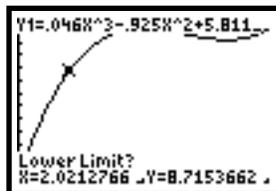Figure 5: Choose the CALC menu, and select the integral calculation.

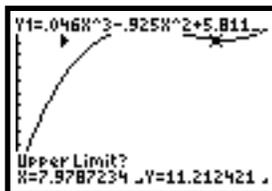Figure 6: Use the left and right keys to select the lower limit.

Figure 7: Use the left and right keys to select the upper limit.

Figure 8: Press ENTER and the calculator will approximate the definite integral.

- **Use your calculator to complete the entries in the table below.**

a	b	$\int_a^b v(t)dt$	*Interpretation*
1	5		
2	8		
0	9.73		

- **Suppose that the function s(t) was differentiated, and what you got was v(t). What quantity would the function s(t) represent? Find a possible formula for s(t).**

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[2] The answer that your calculator provides is usually not the precise value for the area under a curve. The answer that your calculator provides is usually a close approximation of the area under the curve.

[3] On a TI-83, you can also enter the end-points directly by entering the number for the lower end-point when the calculator asks for it (and pressing ENTER), and then entering the number for the upper end-point when the calculator asks for it (and pressing ENTER).