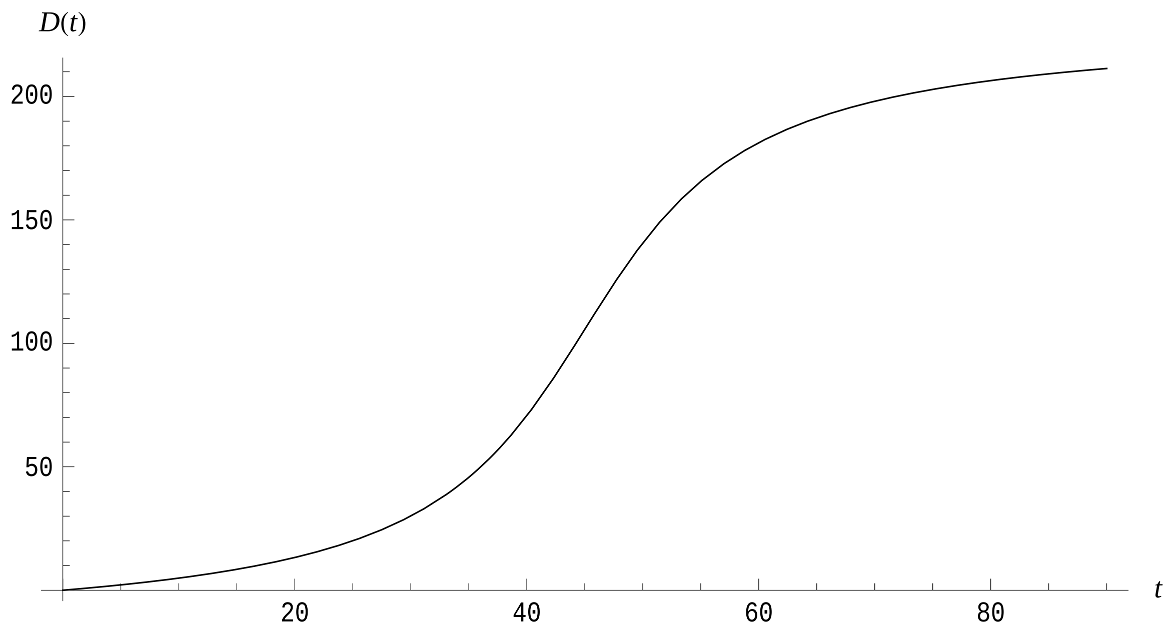
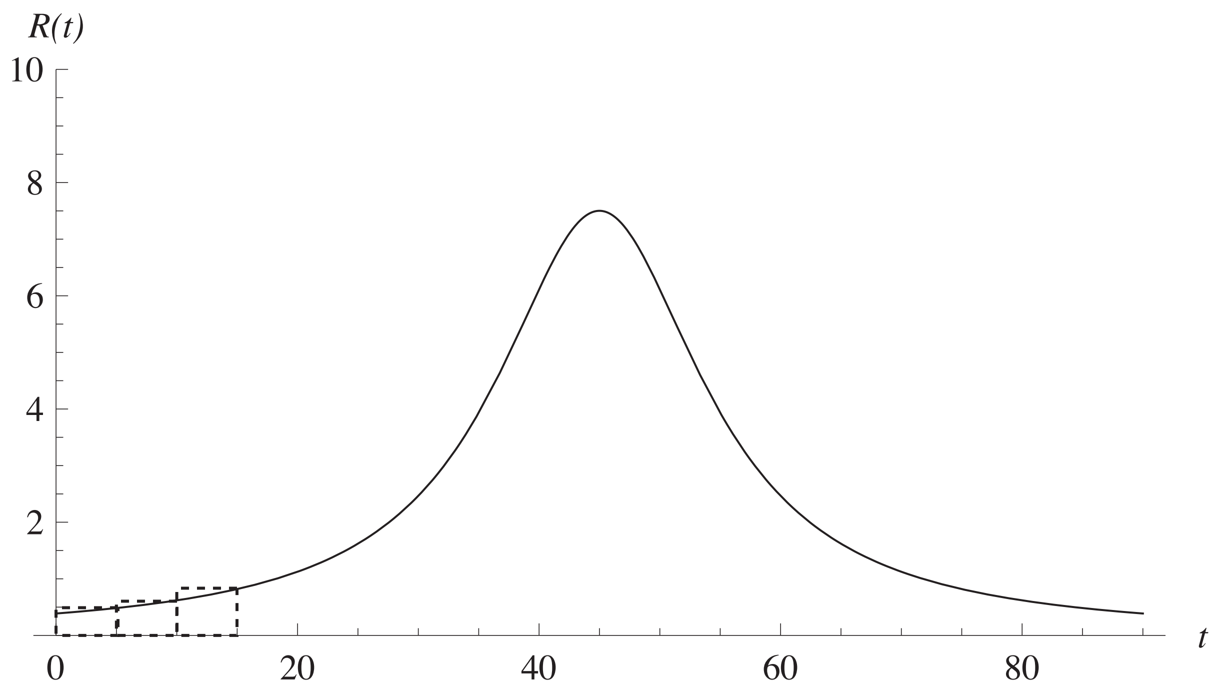
In Mini-Project 3 we will see that, if $D(t)$ denotes the total, or *cumulative*, number of deaths (at time t, with t measured in days) since the start of a certain Ebola outbreak, then $D(t)$ can be modeled reasonably well by the arctangent function sketched on the axes below.



We will also see that the daily death *rate* $R(t) = D'(t)$, in deaths/day, can be modeled by the following bell-shaped curve:



Note that we've dashed in a rectangle over each of the first three intervals of length 5, on the above t axis. The height of each rectangle is just the value of the function $R(t)$ at the right endpoint of the interval in question.

1. Continue the process of drawing rectangles over each of the above subintervals of length 5, on the t axis, with the height of each rectangle being the value of $R(t)$ at the rightmost edge of the rectangle.

2. For any time T, Let $A(T)$ denote the *total area* of the rectangles you've sketched in, between $t = 0$ and $t = T$. Explain *carefully* why $A(T)$ should be approximately equal to $D(T)$ (where $D(t)$ is as described on page 1 of this tutorial).

3. Let's check how good this approximation is, as follows. Compute $A(5)$, $A(10)$, $A(15)$, $\ldots$, all the way up to $A(90)$. (Recall that each rectangle has base length 5, and height given by the value of $R(t)$ at the right endpoint of the rectangle.) You can do your computations, and write out your answers, in the space below and on the next page.

4. Now, *plot* your points $A(t)$, as a function of t, on the *same set of axes* as we used to plot $D(t)$, on page 1. How well does $A(t)$ approximate $D(t)$? What would we do to get a better approximation?

5. THE MORAL OF THE STORY IS (fill in the blanks): In general, if $R(t)$ is the ________________ of $D(t)$, then $D(t)$ is given by the ________ under the graph of the function $R(t)$!!