Product Rule Problem #1

1. Suppose that you are changing the size of an image on your computer by dragging the top right corner of the image. Say that the bottom left corner of the image is at the origin.

   (a) If the position of the top right corner of the image is given by the functions $x = f(t) = 5 + 2t$ and $y = g(t) = 7 + 3t$, what is the initial size of the image?

   (b) What is the area of the image at time $t$?

   (c) How fast is the width of the image changing at time $t$?

   (d) How fast is the height of the image changing at time $t$?

   (e) Draw a picture demonstrating the size of the picture at $t = 1$ and $t = 2$. Find the difference in the two areas.

   (f) Draw a picture demonstrating the size of the picture at $t$ and $t + h$. Find the difference in the two areas.

   (g) Divide the equation from the previous problem by $h$ and take the limit as $h$ goes to 0. What do you get?