Name _____ Date _____

Instructions: Working in teams of two, complete both sides of this worksheet. *Before you begin, please make sure your calculator is in radian mode.*

Part One: Rate of Change (Differential Calculus)

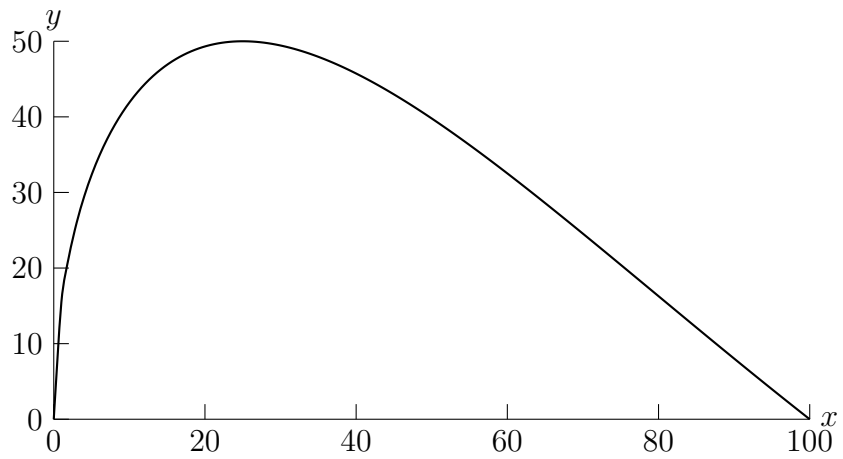
Estimate the slope of the graph of the function $y = \sin(x^2)$ at the points $x = 1$, $x = 2$, and $x = 3$. Compare your methods and answers with those of groups near you. Did their methods differ from yours? Which method(s) do you think are the most accurate? Why?

Part Two: Accumulated Change (Integral Calculus)

Suppose you want to paint the side of a building that has a profile given by the function

$$f(x) = 50 \sin\left(\frac{\pi\sqrt{x}}{10}\right)$$

(shown in the graph below). Both x and $y = f(x)$ have units of feet.



1. Find an estimate of the total area of the building's side by splitting the area up into smaller regular shapes, finding the area of these shapes, then adding to obtain the overall area.

2. What change or changes could you make to your method to improve your estimate?