MA205 - Integral Calculus
Lesson 3: Estimations From Functions
Class Problems

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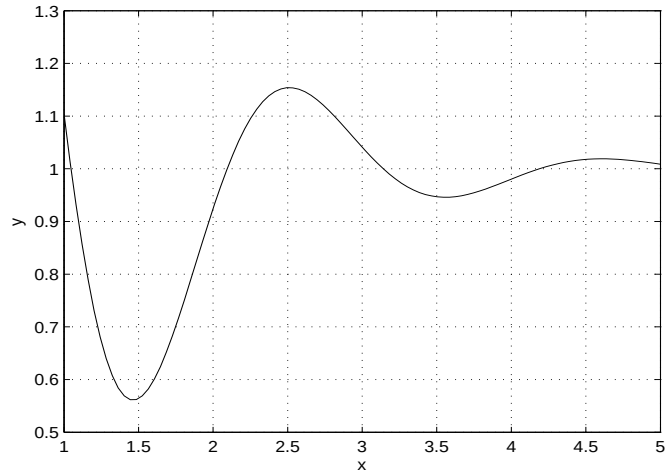
1. Below is the graph of a function $f(x)$.



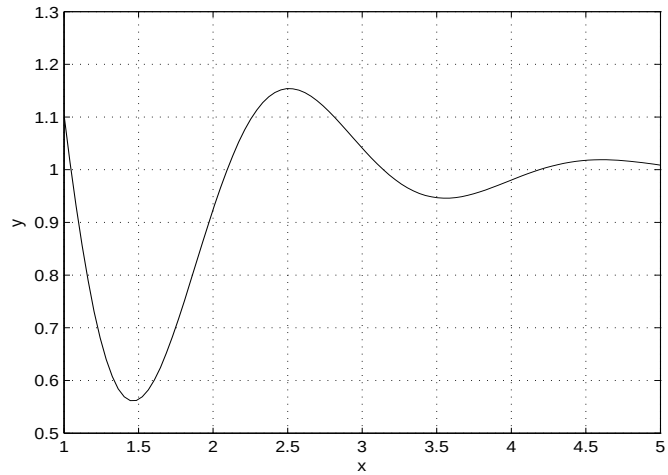
   (a) Using the Midpoint Rule with 4 equally spaced intervals, sketch the rectangles that you should use to estimate the area between the graph of $f(x)$ and the x axis.

   (b) What is the approximate area represented by the rectangles you drew? How can we make the estimate better?

   (c) Try to express the area in summation notation.

   (d) What is the approximate area if instead of 4 intervals we use 8?

2. Using the Trapezoid Rule with 4 equally spaced intervals, sketch the trapezoids that you should use to estimate the area between the graph of $f(x)$ and the x axis, then estimate the area.



3. Now provide an upper estimate for the area of the same region using 4 equally spaced intervals (and any of the methods we have discussed so far). How is this estimate different from an upper estimate using discrete data? Why is this useful?

4. Work #2 of the Problem Solving Problems in Lesson 3. Ask yourself: Physically, what is the difference between *total distance traveled* and *displacement*? Can they ever be the same?