MATH 136 – Calculus 2
Practice on Approximating Areas
January 22, 2020

Background

We have discussed the idea of approximating the area between a graph $y = f(x) \geq 0$ and the x-axis for $a \leq b \leq x$ by using sums of areas of rectangles and worked out a first example. To practice using these ideas you will work through another similar example using a different function, interval, and subdivision. Here's the description of the region we want in formulas: The region between $y = x^2 - 4x + 6$ and the x-axis, for $1 \leq x \leq 2$.

Questions

1. Sketch the region (you may want to complete the square in $x^2 - 4x + 6$ to do this). Check your work by looking at the figure on the back of this page.

2. To subdivide the x-interval $[1, 2]$ into $N = 5$ equal smaller intervals, what Δx should we use? What are the endpoints $x_0, x_1, x_2, x_3, x_4, x_5$ of the intervals?

3. Make rectangles using the value of the function at the *left endpoint* of each smaller interval to get the heights. Sketch these rectangles together with the graph.

4. Write the sum giving the areas of these rectangles using summation notation, and compute the numerical value.

5. Now make rectangles using the value of the function at the *right endpoint* of each smaller interval to get the heights. Sketch these rectangles together with the graph.

6. Write the sum giving the areas of these rectangles using summation notation, and compute the numerical value.

7. What can you say about the area of the region from your computations?

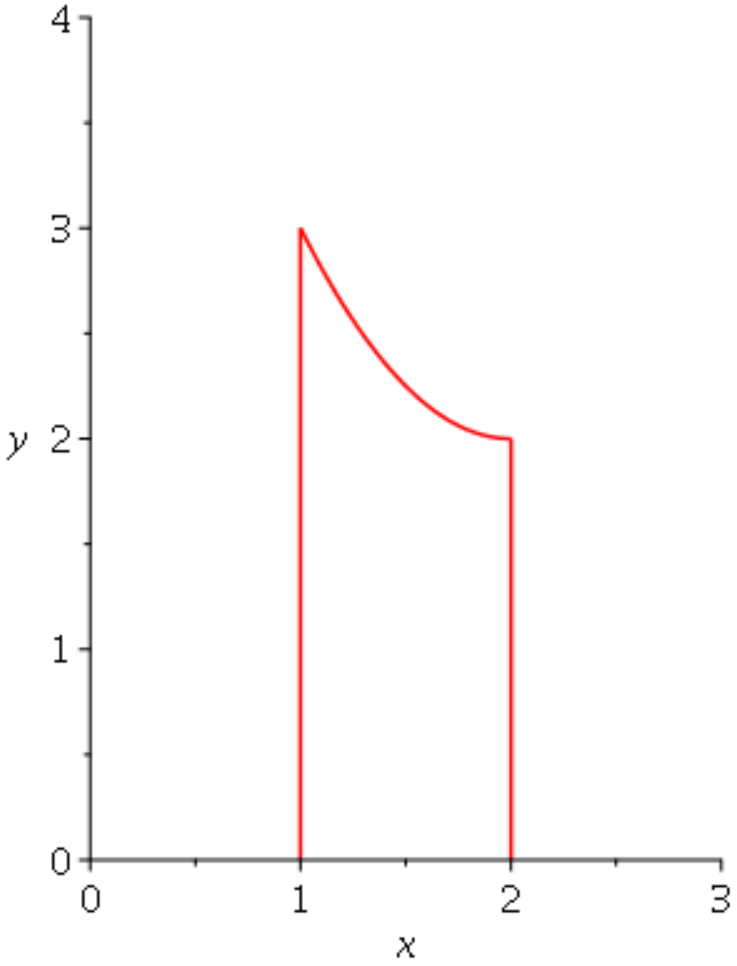

Figure 1: The region