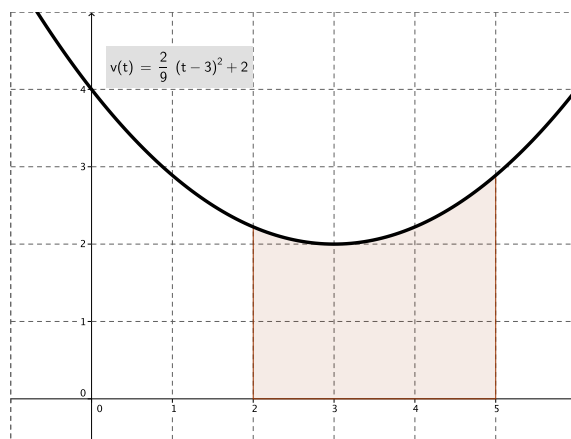


Class Activities: Riemann Sums

Get into groups of 2–4 and work through all of the following activity. These are not to be turned in, and they will not be graded. Instead, record your group's work on your copy and keep it for notes. I will be coming to each group one by one as you work to observe what you're doing, answer questions, and catch any misconceptions that are happening. We will stop with about 10 minutes remaining to debrief the main ideas.

Suppose that an object moving along a straight-line path has its velocity in feet per second at time t (in seconds) given by $v(t) = \frac{2}{9}(t - 3)^2 + 2$. Here is a sketch of the graph of $v(t)$; the area under the curve, above the t -axis, and between $t = 2$ and $t = 5$ shaded in.



1. What quantity does the shaded area represent? (What would the value of that area tell you in terms of the object?)
2. Let's estimate the distance traveled on the interval $[2, 5]$ using four subdivisions. If we were to use four rectangles, what would be the value of Δt in a Riemann sum?
3. Suppose we wanted to estimate the distance using L_4 . What are the four left-hand endpoints you would use?

Continued \rightarrow

4. Now suppose you wanted to estimate the distance using R_4 . What are the four endpoints you would use this time?

5. Finally suppose you wanted to estimate the distance using M_4 . What are the four endpoints you would use this time?

6. List all twelve of the points you wrote down above along with the values we get when applying the function v at those points. Give your answers correct to four decimal places (which means, you shouldn't use the graph to estimate these v -values).

Left endpoints	$v(t)$	Right endpoints	$v(t)$	Midpoints	$v(t)$

7. Using the information above, compute L_4 , R_4 , and M_4 .

8. Find the average of L_4 and R_4 . Does it equal M_4 ?

9. Look back at the graph and reality-check your answers for L_4 , R_4 , and M_4 by answering the following questions:
 - The area that is shaded in MUST be larger than _____.
 - The area that is shaded in MUST be smaller than _____.

Do your estimates fall within these absolute boundaries? If not, go back and debug your work.