

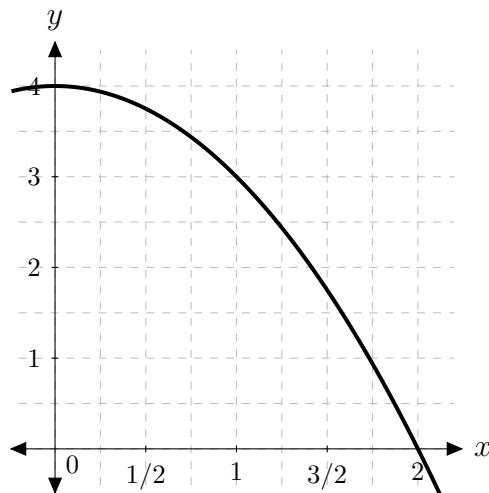
Name: \_\_\_\_\_

Discussion Section: \_\_\_\_\_

**Solutions should show all of your work, not just a single final answer.**

## 5.1: Areas and Distances

1. The graph of  $y = 4 - x^2$  over the interval  $[0, 2]$  is given below.



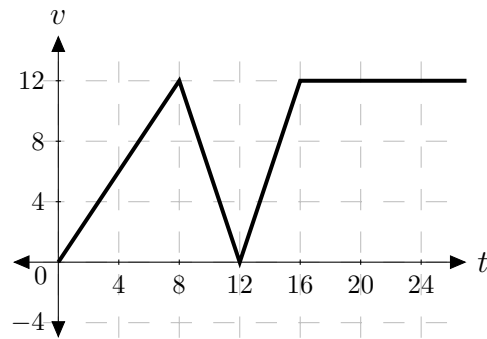
In (a), (b), and (c) below, estimate the area under the graph over  $[0, 2]$  using 4 rectangles and the indicated type of endpoints: sketch the rectangles and then compute their areas. Determine from your sketch if the areas of the rectangles provide an underestimate or overestimate of the area under the curve, or if it can't be easily determined.

(a) Right endpoints.

(b) Left endpoints.

(c) Midpoints.

2. Here's a graph of the velocity (in ft/sec) of an object moving along a horizontal line.



(a) Over the interval  $0 \leq t \leq 24$ , determine the intervals when the object is speeding up and the intervals when the object is slowing down.

(b) From the end of Section 5.1 of the textbook, distance traveled is the area under the velocity vs. time graph. Use this to compute the distance traveled by the object from  $t = 0$  to  $t = 8$  seconds, in feet.

(c) Compute the distance traveled by the object from  $t = 8$  to  $t = 20$  seconds, in feet.

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## 5.2: The Definite Integral

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3. Evaluate the integral  $\int_1^4 (x + 1) dx$  by drawing a picture and interpreting the integral in terms of areas.

4. Evaluate the integral  $\int_{-3}^3 (1 + \sqrt{9 - x^2}) dx$  by drawing a picture and interpreting the integral in terms of areas.

5. T/F (with justification) A definite integral can be negative.