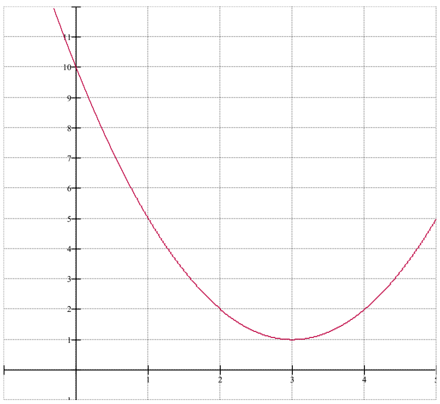
Chapter 4 Integral Worksheet

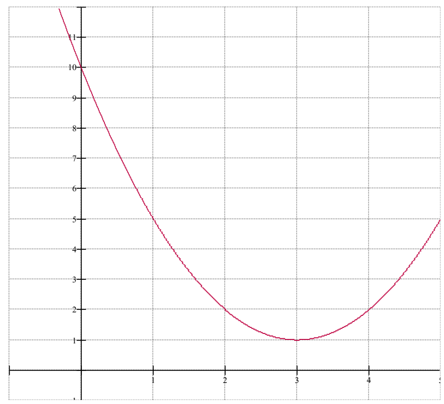
Approximate Area under a curve ____________________

The graph of the function $f(x) = x^2 - 6x + 10$ is shown below. The exact area bound by $f(x), x = 0, x = 4, \textit{and the } x - \textit{axis is } \frac{40}{3} \approx 13.333$. We are going to approximate the area bound by the curves by different methods using 4 partitions. Rectangles from the left are the model to follow. Draw the rectangles or trapezoids on the picture first.

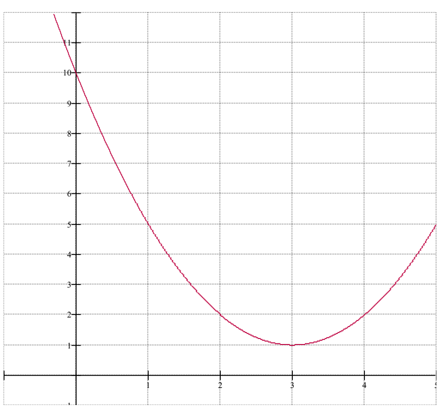


Rectangles from the left (A=bh)

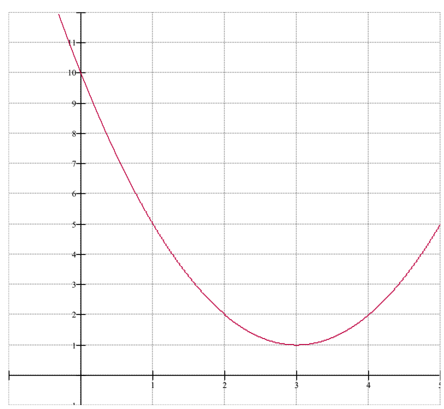
$$A = \triangle x \cdot f(0) + \triangle x \cdot f(1) + \triangle x \cdot f(2) + \triangle x \cdot f(3)$$
$$= \triangle x\big(f(0) + f(1) + f(2) + f(3)\big)$$
$$= 1(10 + 5 + 2 + 1) = 18$$



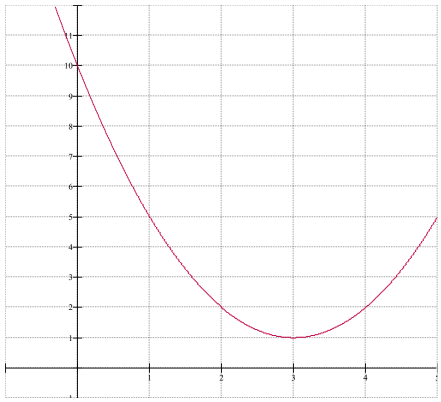
Rectangles from the right (A=bh)

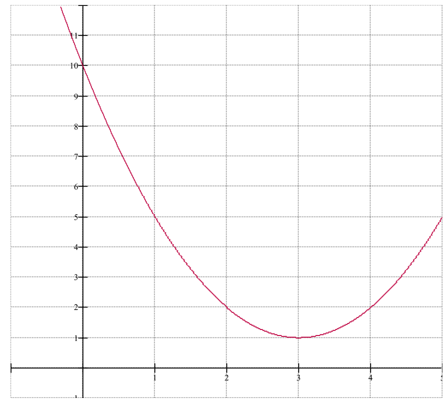


Rectangles above (A=bh)



Rectangles below (A=bh)



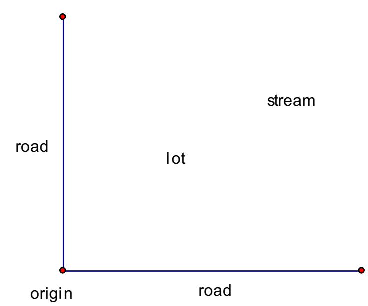


Rectangles using midpoints (A=bh)

Trapezoids $A = \frac{h(b_1 + b_2)}{2}$

1) A man wants to approximate the area of his lot. It's bound by a stream on two sides and roads at right angles on the other two sides as shown. He maps his property in the x-y coordinate system and measures the distance from the x-axis to the stream every 50 feet. The data is in the table below. Approximate the area of the man's lot using trapezoids and 6-partitions.

X	0	50	100	150	200	250	300
Y	450	362	305	268	245	156	0



Water is flowing through a water pipe at a rate of gallons per hour. Measurements are taken every hour from noon to 8 PM and the data is shown in the table below. Approximate the amount of water that flows through the pipe for the period from noon to 8 PM using 4 partitions and midpoints.

Time	12	1	2	3	4	5	6	7	8
Gal/hr	21.2	19.6	18.7	19.2	18.4	20.5	16.8	18.5	21.1