A Riemann Sum can be used to approximate the area between a curve and the x axis for an interval of the curve that is above the x-axis. The Riemann Sum method involves dividing this area into rectangles that are parallel to the y-axis, finding the area of each of these rectangles, and finally finding the sum of the rectangle areas to approximate the area under the curve.

Example: The figure shows the graph of $f(x) = x^3 - 10x^2 + 24x + 36$ on the closed interval $[0, 8]$. To approximate the area between this portion of the curve and the x-axis, we will construct a Riemann sum as follows:

- Determine the number of sub-intervals we wish to partition the curve into ($n = $ the number of sub-intervals).
- Divide the interval into sub-intervals along the x-axis and determine the width of each sub-interval. They can be any width.
- Choose an x value within the subinterval. We'll label it “$c_i$” where c is the x value and i is the interval number.
- Find $f(c_i)$ for each sub-interval.
- Draw rectangles for each subinterval where $f(c_i)$ is the height of the rectangle of the $i$th interval.
- Find the area of each rectangle by multiplying its width by its height. Then find the sum of all the rectangle areas to approximate the area under the curve.

Example with 4 sub-intervals ($n=4$)

- Four sub-intervals were chosen such that the first one is between $x=0$ and $x=2$ for a width of 2 units, the second is between $x=2$ and $x=5$ for a width of 3 units, etc. Any width less than the width of the entire interval could have been chosen for any sub-interval.
- An x value was chosen within each subinterval. These are $c_1$ through $c_4$.
- The height of each of the four rectangles was found by substituting $c_i$ into $f(x) = x^3 - 10x^2 + 24x + 36$.
- Rectangles are drawn and the area of each rectangle is found by multiplying height times width.

The area under the curve is approximated by:

$$102 + 135 + 31.88 + 150.76 = 419.64.$$
Find a Riemann Sum for $f(x) = x^3 - 10x^2 + 24x + 36$ on the closed interval $[0,8]$ with $n = 5$. 

![Graph of the function $f(x) = x^3 - 10x^2 + 24x + 36$ on the interval $[0,8]$ with 5 subintervals. The area under the curve is shaded.]