

Let $f(x) = x^3$ and consider the region R that is under the graph of $y = f(x)$ and above the x -axis on the interval $[1, 5]$.

1. Sketch the region R .
2. For each sum, sketch a picture that represents the sum, and then approximate the area of R by calculating the sum.
 - (a) L_4 , the left sum with four subdivisions
 - (b) R_4 , the right sum with four subdivisions
 - (c) M_4 , the midpoint sum with four subdivisions
 - (d) T_4 , the trapezoid sum with four subdivisions
3. Which of your answers will be an under-approximation?
4. Which of your answers will be an over-approximation?