Math 151, Extra Credit Problem, Due December 3, 2013

Worth 5 points

You want to compute $\int_1^9 x^3\,dx$ by approximations using Rieman sums. Let N be the number of rectangles that you will use for your approximation. Estimate the area by computing left sums and right sums for $N = 8$ and then computing left sums and right sums for $N = 16$. Why does one type of sum overestimate and the other underestimate? Suppose that a friend computes a Riemann sum with $N = 117$ and obtains 1615.2. Did your friend use a left or right Riemann sum? Without adding up 117 numbers can you compute the other sum (left or right)?