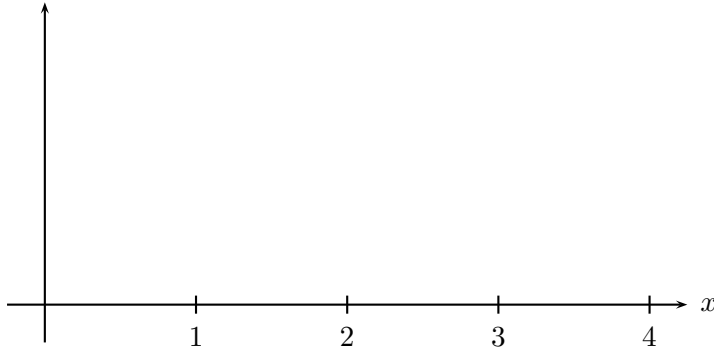


4. [12 points]

a. [6 points] Using 4 equal subdivisions, find a Riemann sum which is an underestimate for

$$\int_2^4 \ln(x) dx.$$

Sketch a graphical representation of your Riemann sum on the axes below, and write “LHS” or “RHS” next to your figure to indicate whether you are using a left-hand sum or a right-hand sum. Write out the terms of the Riemann sum using exact values (no calculator approximations). There is no need to simplify the sum.



$$\int_2^4 \ln(x) dx \approx \underline{\hspace{15em}}$$

b. [3 points]

Show that  $\int \ln(x) dx = x \ln(x) - x + C$ , where  $C$  is a constant.

c. [3 points]

Using part (b), find the exact value of the integral  $\int_2^4 \ln(x) dx$ .