1. Find the Riemann Sums for the following functions on the given interval using the given information. Include a sketch of the function and the rectangles with your answer.

   a) \( f(x) = x^2 \) on \([0, 2]\) with \( n = 4 \) using left endpoints as the sample points.

   b) \( f(x) = x^2 \) on \([0, 2]\) with \( n = 4 \) using right endpoints as the sample points.

   c) \( f(x) = \frac{1}{x} \) on \([1, 2]\) with \( n = 3 \) using left endpoints as the sample points.

   d) \( f(x) = \frac{1}{x} \) on \([1, 2]\) with \( n = 3 \) using right endpoints as the sample points.
2. Use a definite integral to find the area under the given positive function over the given interval. Include a rough sketch of the region with your answer.

a) \( y = x^3; [0, 1] \).

b) \( y = \sqrt{x}; [1, 4] \).

c) \( y = \sec^2(x); [0, \pi/4] \).

d) \( y = \frac{1}{x}; [1, 2] \).
3. Compute the following definite integrals of negative functions and interpret your answers in terms of area above the curve. Include a rough sketch of the region with your answer.
   
   a) \( y = x^3; [-2, -1]. \)

   b) \( y = 1 - \sqrt{x}; [1, 4]. \)

   c) \( y = \cos(x); [\pi/2, 3\pi/2]. \)

   d) \( y = \frac{1}{x}; [-3, -1]. \)
4. The average value of a function $f(x)$ on the interval $[a, b]$ is given by the formula

$$f_{ave} = \frac{1}{b-a} \int_a^b f(x) \, dx.$$ 

Compute the average value of the given function over the given interval.

a) $f(x) = x(x + 1) + 1; [0, 3]$.

b) $f(x) = 4\sqrt{x} - \frac{2}{x^3}; [1, 8]$.

c) $f(x) = \cos(2x) + \sin(2x); [0, \pi/2]$.

d) $f(x) = e^{3x}; [-1, 1]$.