

1. (12 pts.) Let $f(x) = \frac{1}{x^2}$.

(a) Approximate the area under the curve $y = f(x)$ from **a = 1 to b = 7** using a Riemann sum with 2 left rectangles. (Write the sum; you need not evaluate it.)

(b) Find the exact value of the area under the curve $y = f(x)$ from **a = 1 to b = 7** by evaluating an appropriate definite integral using the Fundamental Theorem of Integral Calculus

2. (15 pts.) Find the following integrals:

(a) $\int (\sqrt[3]{x^5} + e^{-2x} + \frac{1}{\pi}) dx$

(b) $\int \frac{x-1}{x^2} dx$

(c) $\int_{-3}^{-1} (e - x^{-1}) dx$

3. (14 pts.) Use substitution to find the following integrals:

(a) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$

(b) $\int_1^2 \frac{3x^2}{\sqrt{x^3+8}} dx$

4. (6 pts.) Find the average value of $f(x) = x^3$ on $[0,2]$.

5. (7 pts.) The acceleration of a particle at time t seconds is given by $\mathbf{a}(t) = 2t + 4e^{-0.2t}$ ft./sec². Find $v(t)$, the velocity of the particle at time t , if its initial velocity (the velocity at time $t=0$) is 5 ft/sec.

6. (16 pts.) Set up, but do not evaluate, integrals for the area

(a) Between the curves $y = x^3$ and $y = x^2$ from $x = -1$ to $x = 1$.

(b) Bounded by the curves $y = x$ and $y = 4x - x^2$.