

I-U1

1. The Riemann definition of the definite integral is given by

$$\lim_{n \rightarrow \infty} \sum_{i=0}^n f(x_i) \Delta x = \int_a^b f(x) dx$$

where $\Delta x = \frac{b-a}{n}$. Explain why this is so in the context of area under a curve. You may use diagrams to accompany your explanation.

I-U2

2. Write a definite integral whose value equals

$$\lim_{n \rightarrow \infty} \sum_{i=0}^n \sec^2\left(3 + \frac{5i}{n}\right) \frac{5}{n}$$

3. Write the definite integral as an infinite Riemann sum using correct notation

$$\int_2^5 x^3 + \sqrt{x-1} dx$$

I-U3a

4. Find both the left and right rectangle approximations for $\int_5^7 20 - (x+3)^2 dx$ using 4 rectangles of equal width.

I-U3b

5. Approximate $\int_{-5}^{-1} -\frac{3}{x} dx$ using 4 trapezoids of equal width.

I-U3c

6. Selected values for $f(x)$ are given in the table below. Use a midpoint Riemann sum to approximate $\int_{10}^{90} f(x) dx$ using 4 intervals of equal width.

x	10	20	30	40	50	60	70	80	90
$f(x)$	8	12	35	44	37	26	54	61	83

I-U5

Evaluate each definite integral.

7. $\int_{-1}^3 x^2 - 2x dx$

8. $\int_2^5 \frac{3}{x+1} dx$

I-A2a

9. $\int 8x \sec(3x^2) \tan(3x^2) dx$

10. $\int \frac{3x}{x^2+4} dx$