

Practice Quiz No. 10

Show all of your work, label your answers clearly, and do not use a calculator.

Problem 1

a Find the Riemann sum with n rectangles for the function $f(x) = 3x + 1$ on the interval $[1, 2]$. To simplify, use the formula

$$\sum_{k=1}^n k = \frac{n(n+1)}{2}$$

b Now take the limit of this expression as n goes to infinity.

Problem 2

a Find the Riemann sum with n rectangles for the function $f(x) = x^2 + x$ on the interval $[0, 3]$. To simplify, use the formulas

$$\sum_{k=1}^n k = \frac{n(n+1)}{2} \quad \text{and} \quad \sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$$

b Now take the limit of this expression as n goes to infinity.

Problem 3 Using the formulas for the areas of common shapes (e.g. triangles, rectangles, and circles), compute the following definite integrals:

a $\int_{-3}^5 2x dx$

b $\int_{-3}^3 \sqrt{9 - x^2} dx$

c $\int_{-2}^1 4 dx$

d $\int_0^5 \sqrt{25 - x^2} dx$

e $\int_{-3}^5 |x - 1| dx$

f $\int_2^{-5} 3 dx$ (*No, it's not a typo.*)