

Practice Assessment

Approximating Areas

These **practice problems** are designed to help you **prepare for our course exams** and **assess your understanding** of the course material at the expected level. Aim to complete them **in class, during tutoring, office hours, or on your own**, and try to solve them **without notes or a calculator**, just like on the **actual exams**. Remember, **practice makes perfect**, so don't hesitate to **ask for help** if you get stuck.

Two useful formulas for finite sums are:

$$\bullet \sum_{j=1}^n j = 1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$$

$$\bullet \sum_{j=1}^n j^2 = 1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

1. Compute the indicated sum.

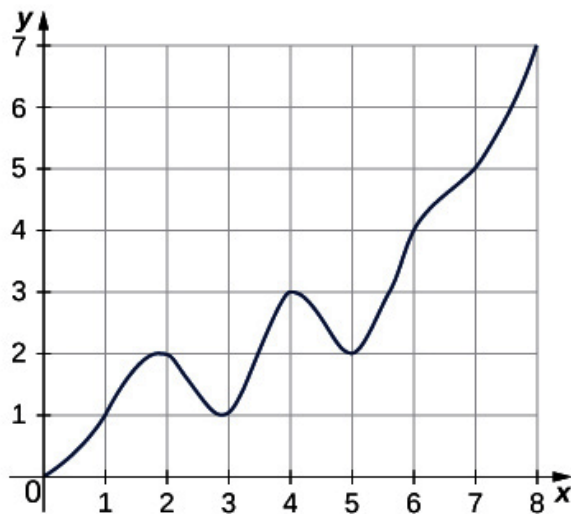
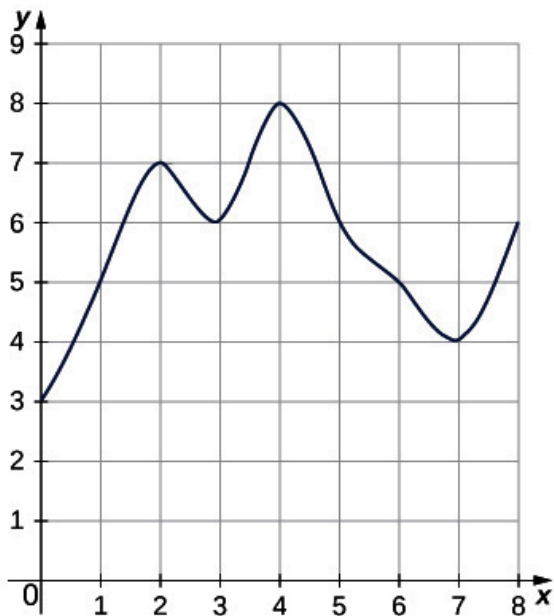
(a) $\sum_{j=1}^6 (3j + 2)$

(b) $\sum_{j=1}^7 (j - 5)$

(c) $\sum_{j=1}^5 (j^2 - 4j + 1)$

(d) $\sum_{j=1}^5 (2j - 5)^2$

2. By reading values from each of the given graphs below, estimate the area under curve by computing the left and right Riemann sums, L_8 and R_8 , respectively.



3. (a) Compute the left and right Riemann sums using 4 subintervals, L_4 and R_4 , for the function $f(x) = 2x^2 + 3$ on $[0, 4]$

- (b) Compute the left and right Riemann sums using 6 subintervals, L_6 and R_6 , for the function $f(x) = 6 - x$ on $[0, 3]$

4. Let $f(x) = 3x + 2$.

(a) Find the left Riemann sum, L_4 for $f(x)$ on $[0, 2]$ with $n = 4$ subintervals.

(b) Find an expression for the left Riemann sum, L_n for $f(x)$ on $[0, 2]$ with n subintervals.

(c) Find $\lim_{n \rightarrow \infty} L_n$ with L_n obtained from part (b).

(d) Find an expression for the right Riemann sum, R_n for $f(x)$ on $[0, 2]$ with n subintervals.

(e) Find $\lim_{n \rightarrow \infty} R_n$ with R_n obtained from part (d).

(f) What can you conclude about the area bounded by the graph of $y = f(x)$, the x -axis, the line $x = 0$ and the line $x = 2$.