

Sections 5.2: Additional Problems

1. Express this limit as a definite integral. Assume that a right sum was used.

$$\lim_{n \rightarrow \infty} \frac{2}{n} \sum_{i=1}^n \left(3 \left(1 + \frac{2i}{n} \right)^5 - 6 \right)$$

2. Express this limit as a definite integral. Assume that a right sum was used.

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \left(2 + \frac{i}{n} \right)^2 \frac{1}{n} =$$

3. Evaluate the integral by interpreting it in terms of areas.

$$\int_{-5}^5 x - \sqrt{25 - x^2} \, dx$$

4. Approximate $\int_2^{10} \ln(x) \, dx$ using a

- (a) left sum with 4 rectangles of equal width.
 (b) right sum with 4 rectangles of equal width.

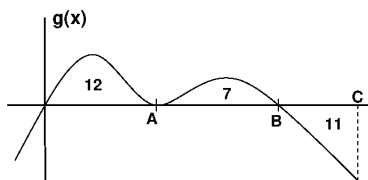
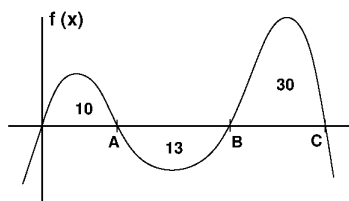
5. Approximate $\int_2^{17} (x^2 - 4) \, dx$ using a

- (a) left sum with 5 rectangles of equal width.
 (b) right sum with 5 rectangles of equal width.

6. Assume that $f(x)$ is increasing on the interval (a, b) . $\int_a^b f(x) \, dx$ is approximated with a left sum. Will this approximation be an overestimate or an underestimate?

7. Assume that $f(x)$ is decreasing on the interval (a, b) . $\int_a^b f(x) \, dx$ is approximated with a left sum. Will this approximation be an overestimate or an underestimate?

Calculate the definite integrals in problems 8-15 by using the properties of definite integrals and referring to the graphs of $f(x)$ and $g(x)$.



8. $\int_0^A f(x) \, dx$

12. $\int_A^B 3f(x) \, dx$

9. $\int_A^C g(x) \, dx$

13. $\int_0^B [4f(x) + 3g(x)] \, dx$

10. $\int_C^A f(x) \, dx$

14. $\int_A^C [3f(x) - 10g(x)] \, dx$

11. $\int_C^0 g(x) \, dx$

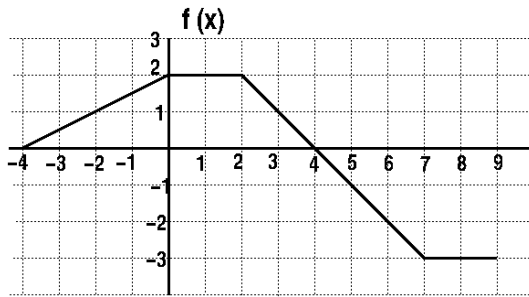
15. $\int_C^B [-2f(x) + 3g(x)] \, dx$

16. If $\int_0^A f(x) dx = 5$ and $\int_0^A [3f(x) + 4g(x)] dx = 47$, find $\int_0^A g(x) dx$.

17. If $\int_A^B f(x) dx = 12$, $\int_A^B h(x) dx = 22$ and
 $\int_A^B [2f(x) - 3g(x) + 5h(x)] dx = 150$, find $\int_A^B g(x) dx$.

18. If $\int_C^D f(x) dx = -20$ and $\int_C^D [7f(x) + 6g(x)] dx = 70$, find $\int_D^C g(x) dx$.

In problems 19-22, use the graph to compute the definite integrals.



19. $\int_0^4 f(x) dx$

20. $\int_{-4}^4 f(x) dx$

21. $\int_4^7 f(x) dx$

22. $\int_1^8 f(x) dx$