

Approximate the given integrals using the specified technique.

1. Left Endpoint Riemann Sum

a. $\int_{-2}^1 (x^2 + 2) dx$ with 6 subintervals.

b. $\int_0^6 \sqrt{x+1} dx$ with 3 subintervals.

2. Right Endpoint Riemann Sum

a. $\int_0^3 (x^3 - 3) dx$ with 3 subintervals.

b. $\int_3^5 (-x^2 + 10x - 20) dx$ with 4 subintervals.

3. Midpoint Riemann Sum

a. $\int_0^\pi \sin(2x) dx$ with 3 subintervals.

b. $\int_{-2}^4 (16 - x^2) dx$ with 6 subintervals.

4. Trapezoidal Rule

a. $\int_0^\pi x \sin x dx$ with 4 subintervals.

b. $\int_{-2}^6 e^x - 2 dx$ with 4 subintervals.

Evaluate each of the following integrals.

5. $\int (x^3 - 2)^2 dx$

6. $\int \frac{x^2 + 2}{x^2} dx$

7. $\int x\sqrt{x^2 - 2} dx$

8. $\int \frac{1 + \cos^2 \theta}{\cos^2 \theta} d\theta$

9. $\int \frac{x^2 + 1}{x^3 + 3x + 7} dx$

10. $\int \frac{2x^2 + 7x - 3}{x - 2} dx$

11. $\int \frac{1}{1 + \sqrt{3x}} dx$

12. $\int (\sin x + \cos x)^2 dx$

13. $\int e^{3x+2} dx$

14. $\int \frac{e^{2/x}}{x^2} dx$

Evaluate each definite integral using the First Fundamental Theorem.

15. $\int_0^3 (3x^2 + x - 2) dx$

16. $\int_4^9 \frac{1 - \sqrt{u}}{\sqrt{u}} du$

17. $\int_{-2}^{-1} \frac{x^2 - 1}{x^2} dx$

18. $\int_{-1}^1 \frac{1}{\sqrt{1 - x^2}} dx$

$$19. \int_1^2 (x-1)\sqrt{2-x} dx$$

$$20. \int_0^{\pi/2} \sin\left(\frac{2x}{3}\right) dx$$

$$21. \int_0^3 |x^2 - 4| dx$$

$$22. \int_0^{\sqrt{2}} x e^{-x^2/2} dx$$

Evaluate the derivative of each of the following using the Second Fundamental Theorem.

$$23. \frac{d}{dx} \left[\int_1^x \frac{1}{t} dt \right]$$

$$24. \frac{d}{dx} \left[\int_{\pi}^{x^2} \cos t dt \right]$$

$$25. \frac{d}{dx} \left[\int_x^{x^2} (-2t - 2) dt \right]$$

$$26. \frac{d}{dx} \left[\int_x^{x^2} 2\sqrt{t+3} dt \right]$$

Calculate the average value of the functions on the given intervals.

$$27. f(x) = \sqrt{x+3} \quad [-2, 13]$$

$$28. f(x) = \sin 5x \quad [0, \pi/2]$$

$$29. f(x) = \frac{2}{4+x^2} \quad [-1, \sqrt{3}]$$

$$30. f(x) = \frac{x}{x+1} \quad [1, e]$$

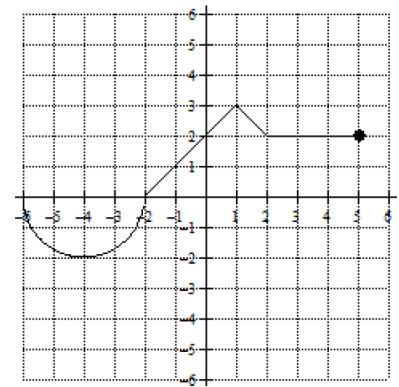
Pictured to the right is the graph of $f(t)$. If $F(x) = \int_{-6}^{2x} f(t) dt$

$$31. \text{ Find the value of } F(0).$$

$$32. \text{ Find the value of } F(-1/2).$$

$$33. \text{ Find the value of } F'(-2).$$

$$34. \text{ Find the value of } F'(2.5).$$



Pictured the right is the graph of f . If $G(x) = \int_{-2}^x f(t) dt$

$$35. \text{ Find the value of } G(3).$$

$$36. \text{ Find the value of } G(-4).$$

$$37. \text{ Find the value of } G'(-2).$$

