

1. Use the midpoint rule with  $n = 3$  to estimate the value of  $\int_{-2}^4 \frac{x}{1+x^2} dx$ .
2. Evaluate the integral  $\int_{-1}^1 x(4+3x) dx$ .
3. Evaluate the integral  $\int_{-3}^3 x^3 dx$ .
4. Evaluate the integral  $\int_0^1 \sin(\pi x) dx$ .
5. Which is greater,  $\int_{-1}^1 x^2 dx$  or  $\int_{-1}^1 |x| dx$ ?
6. Find the average value of the function  $f(x) = \frac{1}{3}x^{\frac{1}{3}}$  over the interval  $[0, 8]$ .
7. The velocity of an object is  $v(t) = 2t - 6$ . Find the total distance traveled over  $0 \leq t \leq 4$ .
8. Evaluate the indefinite integral  $\int \frac{1}{\sqrt{x}} + \sec^2 x dx$ .
9. Evaluate the indefinite integral  $\int -2 \sin(\theta) \cos^3(\theta) d\theta$ .
10. Differentiate the function  $g(x) = \int_x^0 \frac{\sin t}{t} dt$ .
11. Differentiate the function  $g(x) = \int_0^{x^2} \frac{1}{1+t} dt$ .

12. Find the area enclosed between the curve  $y = 1 - x^4$  and the  $x$ -axis.

13. Evaluate the integral  $\int_{-2}^2 x \cos x \, dx$

14. Which of the following are equal?

a)  $\int_{\frac{1}{4}}^1 \frac{1}{2\sqrt{x}} e^{\sqrt{x}} dx$

b)  $\int_{\frac{1}{4}}^1 \frac{1}{\sqrt{x}} e^{\sqrt{x}} dx$

c)  $\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \cos(x) e^{\sin x} dx$

d)  $\int_{\frac{1}{4}}^{\frac{1}{2}} e^{2x} dx$

e)  $\int_{\frac{1}{2}}^1 2e^x dx$

15. Differentiate  $y = (e^{\sqrt{x}})^2$ .

16. Let  $g(x) = \frac{3x}{x+1}$ . Find a formula for  $g^{-1}(x)$ .

17. Let  $y = \sin(\ln x)$ . Find  $y''$ .

18. Evaluate the integral  $\int \frac{t^2}{4-t^3} dt$ .

19. Evaluate the integral  $\int_0^{\frac{\pi}{2}} (\cos x) e^{\sin x} dx$ .

20. Differentiate  $y = \frac{x^3 \sqrt{x^2+1}}{(x+2)^5}$ .