

Practice Problems

Compute each of the following definite integrals.

1. $\int_0^6 x^2 dx$

2. $\int_1^7 x^2 dx$

3. $\int_1^3 2x - 5 dx$

4. $\int_{-7}^7 x dx$

5. $\int_0^5 x^2 - 2x dx$

6. $\int_{-2}^2 6x^3 - 4x dx$

7. $\int_1^3 \frac{1}{x^2} dx$

8. $\int_{-4}^{-1} \frac{1}{x^2} dx$

9. $\int_{-1}^3 \frac{1}{x^2} dx$

10. $\int_1^4 \frac{1}{x} dx$

11. $\int_{-4}^{-1} \frac{1}{x} dx$

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

13. $\int_0^4 \frac{1}{2} \sqrt{x} dx$

14. $\int_7^{12} \sqrt{x-3} dx$

15. $\int_{-\pi}^{\pi} \sin x dx$

16. $\int_0^{\pi} \sin x dx$

17. $\int_0^{\pi/2} \cos x dx$

18. $\int_0^{\pi/2} \cos 2x dx$

19. $\int_0^1 \frac{1}{1+x^2} dx$

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

21. $\int_0^1 e^{2x} dx$

22. $\int_0^5 e^{-x} dx$

23. $\int_0^2 e^{-3x} dx$

24. $\int_0^{\ln 8} (e^x - e^{-x}) dx$

25. $\int_0^3 2^x dx$

26. $2 \int_{-1}^1 \sqrt{1-x^2} dx$

(Hint: Don't try (yet) to solve this algebraically. Instead, draw a picture!)

27. a) $\int_1^N \frac{1}{x^2} dx$

b) $\lim_{N \rightarrow \infty} \int_1^N \frac{1}{x^2} dx$

28. a) $\int_1^N e^{-2x} dx$

b) $\lim_{N \rightarrow \infty} \int_1^N e^{-2x} dx$

29. a) $\int_0^N \frac{1}{x^2+1} dx$

b) $\lim_{N \rightarrow \infty} \int_0^N \frac{1}{x^2+1} dx$

Answers

- | | | | |
|-------------------|--------------------|---------------------------------------|---|
| 1. 72 | 9. undefined | 17. 1 | 25. $\frac{7}{\ln 2}$ |
| 2. 114 | 10. $\ln 4$ | 18. 0 | 26. π |
| 3. -2 | 11. $-\ln 4$ | 19. $\frac{\pi}{4}$ | 27. a) $1 - \frac{1}{N}$ |
| 4. 0 | 12. undefined | 20. $\frac{\pi}{3}$ | b) 1 |
| 5. $\frac{50}{3}$ | 13. $\frac{8}{3}$ | 21. $\frac{1}{2}e^2 - \frac{1}{2}$ | 28. a) $\frac{1}{2e^2} - \frac{1}{2e^{2N}}$ |
| 6. 0 | 14. $\frac{38}{3}$ | 22. $1 - e^{-5}$ | b) $\frac{1}{2e^2}$ |
| 7. $\frac{2}{3}$ | 15. 0 | 23. $\frac{1}{3} - \frac{1}{3}e^{-6}$ | 29. a) $\arctan N$ |
| 8. $\frac{3}{4}$ | 16. 2 | 24. $\frac{49}{8}$ | b) $\frac{\pi}{2}$ |

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