

## 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!)

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

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

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

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

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

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

## Answers

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

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