

Practice Problems | Integrals

Basic Antiderivatives

1. $\int_2^3 2x dx$

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

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

4. $\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} 2 \sec x \tan x dx$

5. $\int_0^{\frac{\pi}{2}} (-\sin x) dx$

6. $\int_0^{\frac{\pi}{4}} \frac{1}{1+x^2} dx$

7. $\int_0^1 e^{4x} dx$

8. $\int_1^e \frac{1}{x} dx$

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

10. $\int_0^1 \frac{x^3}{4} dx$

Fundamental Theorem Practice

11. $\frac{d}{dx} \int_2^x t^2 dt$

12. $\frac{d}{dx} \int_{80}^x \frac{1}{t} dt$

13. $\frac{d}{dx} \int_3^x \sec t dt$

14. $\frac{d}{dx} \int_2^{x^2} t dt$

15. $\frac{d}{dx} \int_2^{5x} t dt$

16. $\frac{d}{dx} \int_9^{3/x} t^3 dt$

17. $\frac{d}{dx} \int_{4x}^5 \frac{1}{1+t^2} dt$

18. $\frac{d}{dx} \int_{2x}^{x^3} (2t - 1) dt$

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U-Sub/Advanced Integrals

$$19. \int \cos 5x dx$$

$$30. \int 6 \csc^3 2x \cot 2x dx$$

$$20. \int \sec\left(\frac{x}{2}\right) \tan\left(\frac{x}{2}\right) dx$$

$$31. \int e^{3x} dx$$

$$21. \int \frac{1}{x^2} \cos\left(\frac{1}{x}\right) dx$$

$$32. \int \frac{1}{e^{4x}} dx$$

$$22. \int (5x - 1)^3 dx$$

$$33. \int \frac{2-e^x}{e^{2x}} dx$$

$$23. \int \sqrt{1 - 4x} dx$$

$$34. \int e^x (1 - e^x)^4 dx$$

$$24. \int x\sqrt{x^2 + 5} dx$$

$$35. \int \frac{dx}{2x-1}$$

$$25. \int 2x(x^2 - 3)^2 dx$$

$$36. \int \frac{3x}{x^2+4} dx$$

$$26. \int \tan^3 x \sec^2 x dx$$

$$37. \int \frac{2x+4}{x^2+4x} dx$$

$$27. \int \csc^4 x \cot x dx$$

$$38. \int \frac{\ln x}{x} dx$$

$$28. \int \sin x \cos x dx$$

$$39. \int x\sqrt{3x-1} dx$$

$$29. \int \sin 4x \cos^3 4x dx$$

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$$40. \int x^2(2x + 1)^5 dx$$

$$41. \int (x + 1)^3 \sqrt{x - 1} dx$$

$$42. \int \frac{4x}{x-1} dx$$

$$43. \int \frac{1}{\sqrt{1-9x}} dx$$

$$44. \int \frac{1}{\sqrt{25-x^2}} dx$$

$$45. \int \frac{1}{1+36x^2} dx$$

$$46. \int \frac{1}{49+x^2} dx$$

$$47. \int \frac{e^x}{\sqrt{1-e^{2x}}} dx$$

$$48. \int \frac{x^2}{1+x^2} dx$$

$$49. \int \frac{x^3}{1+x^2} dx$$

$$50. \int \frac{3x-2}{x^2+4} dx$$

$$51. \int \frac{4}{x\sqrt{9x^2-25}} dx$$

$$52. \int \frac{\cos x}{1+\sin x} dx$$

$$53. \int \frac{\cos x}{1-\sin^2 x} dx$$

$$54. \int \frac{4x+3}{\sqrt{1-x^2}} dx$$

$$55. \int \frac{x-2}{(x+1)^2+4} dx$$

$$56. \int \frac{dx}{x^2+4x+13}$$

$$57. \int 3^{-x} dx$$

$$58. \int 2^{4x} dx$$

$$59. \int \frac{6^x}{3+6^x} dx$$

$$60. \int \frac{\log_4 x}{x} dx$$

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Answer Key

1. 5

2. 9

3. 0

4. $2\sqrt{2} - \frac{4\sqrt{3}}{3}$

5. -1

6. $\tan^{-1}\left(\frac{\pi}{4}\right)$

7. $\frac{e^4}{4} - \frac{1}{4}$

8. 1

9. π

10. $1/16$

11. x^2

12. $\frac{1}{x}$

13. $\sec x$

14. $2x^3$

15. $25x$

16. $-\frac{81}{x^5}$

17. $-\frac{4}{1+16x^2}$

18. $6x^3 - 3x^2 - 8x + 2$

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Answer Key

$$19. \frac{1}{5} \sin 5x + C$$

$$20. 2 \sec\left(\frac{x}{2}\right) \tan\left(\frac{x}{2}\right) dx + C$$

$$21. -\sin\left(\frac{1}{x}\right) + C$$

$$22. \frac{(5x-1)^4}{20} + C$$

$$23. -\frac{1}{6}(1-4x)^{\frac{3}{2}} + C$$

$$24. \frac{1}{3}(x^2+5)^{\frac{3}{2}} + C$$

$$25. \frac{1}{3}(x^2-3)^3 + C$$

$$26. \frac{1}{4}(\tan x)^4 + C$$

$$27. -\frac{1}{4}(\csc x)^4 + C$$

$$28. -\frac{1}{2}\cos^2 x + C$$

$$29. -\frac{1}{16}\cos 4x + C$$

$$30. -(\csc 2x)^3 + C$$

$$31. \frac{e^{3x}}{3} + C$$

$$32. -\frac{1}{4e^{4x}} + C$$

$$33. -\frac{1}{e^{2x}} + \frac{1}{e^x} + C$$

$$34. -\frac{(1-e^x)^5}{5} + C$$

$$35. \frac{1}{2}\ln|2x-1| + C$$

$$36. \frac{3}{2}\ln|x^2+4| + C$$

$$37. \ln|x^2+4x| + C$$

$$38. \frac{(\ln x)^2}{2} + C$$

$$39. \frac{2}{45}(3x-1)^{\frac{5}{2}} + \frac{2}{27}(3x-1)^{\frac{3}{2}} + C$$

$$40. \frac{(2x+1)^8}{64} - \frac{(2x+1)^7}{28} + \frac{(2x+1)^6}{48} + C$$

$$41. \frac{3}{7}(x-1)^{\frac{7}{3}} + \frac{3}{2}(x-1)^{\frac{4}{3}} + C$$

$$42. 4x + 4\ln|x-1| + C$$

$$43. \frac{1}{3}\sin^{-1}(3x) + C$$

$$44. \sin^{-1}\left(\frac{x}{5}\right) + C$$

$$45. \frac{1}{6}\tan^{-1}(6x) + C$$

$$46. \frac{1}{7}\tan^{-1}\left(\frac{x}{7}\right) + C$$

$$47. \sin^{-1}(e^x) + C$$

$$48. x - \tan^{-1}(x) + C$$

$$49. \frac{1}{2}x^2 - \frac{1}{2}\ln|1+x^2| + C$$

$$50. \frac{3}{2}\ln|x^2+4| - \tan^{-1}\left(\frac{x}{2}\right) + C$$

$$51. \frac{4}{5}\sec^{-1}\left|\frac{3}{5}x\right| + C$$

$$52. \tan^{-1}(\sin x) + C$$

$$53. \ln|\sec x + \tan x| + C$$

$$54. -4\sqrt{1-x^2} + 3\sin^{-1}x + C$$

$$55. \frac{1}{2}\ln\left|\left(\frac{x+1}{2}\right)^2 + 1\right| - \frac{3}{2}\tan^{-1}\left(\frac{x+1}{2}\right) + C$$

$$56. \frac{1}{3}\tan^{-1}\left(\frac{x+2}{3}\right) + C$$

$$57. -\frac{1}{(\ln 3)^{3x}} + C$$

$$58. \frac{2^{4x}}{4(\ln 2)} + C$$

$$59. \frac{1}{\ln 6}\ln|3+6^x| + C$$

$$60. \frac{1}{2\ln 4}(\ln x)^2 + C$$