

# 50 Integrals

雀, [E-mail Address](#)

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해설

1.

$$\int_0^{\frac{\pi}{2}} \frac{1}{3 \sin x + 4 \cos x} dx$$

2.

$$\int_0^1 \frac{x - \sqrt{x - x^2}}{2x - 1} dx$$

3.

$$\int_0^{\frac{\pi}{4}} \frac{3 \sin x + 4 \cos x}{4 \sin x + 3 \cos x} dx$$

4.

$$\int_0^{\ln \sqrt{2}} \sqrt{\tanh x} dx$$

5.

$$\int_0^{\frac{\pi}{4}} \frac{x}{(\sin x + \cos x) \cos x} dx$$

6.

$$\int_0^{\sqrt{3}} \arctan \left( \frac{x(3 - x^2)}{1 - 3x^2} \right) dx$$

7.

$$\int_0^{\pi} x \sin^{1728} x dx$$

8.

$$\int_0^{\frac{\pi}{2}} \sin^{2024} x \cos(2024x) dx$$

9.

$$\int_1^{\infty} \frac{\ln x}{x\sqrt{x^2 - 1}} dx$$

10.

$$\int_0^{\frac{\pi}{2}} \frac{\sin^2(2024x)}{\sin^2 x} dx$$

11.

$$\int_0^{\frac{1}{2}} \frac{4x + 7}{(7x + 4)^2 \sqrt{1 - x^2}} dx$$

12.

$$\int_{-\pi}^{\pi} \frac{\sin(2023x)}{(2^{\sin x} + 1) \sin x} dx$$

13.

$$\int_0^{\frac{\pi}{2}} f(f(f(x))) dx \text{ where } f(x) = \frac{\pi}{2(1 + \tan^e x)}$$

14.

$$\int_0^1 \underbrace{f(f(f(\dots f(x) \dots)))}_{2024} dx \text{ where } f(x) = \frac{1}{1 + (1 - \frac{1}{x})^{2024}}$$

15.

$$\int_0^1 \frac{1}{\cot x - \tan(1-x)} dx$$

16.

$$\int_1^{\pi} \frac{1}{x + x\sqrt{\pi}} dx$$

17.

$$\int_0^{\frac{\pi}{4}} \frac{\sqrt{\tan x}}{\sin 2x} dx$$

18.

$$\int_0^{\frac{\pi}{2}} \sqrt{\tan x} dx$$

19.

$$\int_0^{\frac{\pi}{2}} \sqrt[19]{\tan x} dx$$

20.

$$\int_0^{\frac{\pi}{4}} \ln \left( \cos \left( x + \frac{\pi}{4} \right) \right) \cos 2x dx$$

21.

$$\int_0^1 \sqrt{x^{2023} - x^{2024}} dx$$

22.

$$\int_0^{\infty} \sin \left( \frac{1}{x} \right) \left( \frac{1}{3x} \right) dx$$

23.

$$\int_0^{\infty} \frac{\ln x (\ln x + 1)}{x^{2x-1}} dx$$

24.

$$\int_0^1 \frac{\sin(\ln x)}{\ln x} dx$$

25.

$$\int_0^1 \frac{\arctan x}{x+1} dx$$

26.

$$\int_0^1 \frac{x^{2024} - 1}{\ln x} dx$$

27.

$$\int_0^{\frac{\pi}{2}} \ln(\sec^2 x + 360) dx$$

28.

$$\int_0^\infty \frac{x - \sin x}{x^5 + 4x^3} dx$$

29.

$$\int_1^{\sqrt{2}} \frac{x^4 - 1}{x^2 \sqrt{x^4 - x^2 + 1}} dx$$

30.

$$\int_0^2 \frac{x-1}{x\sqrt{x^2-2x+2} + x^2-2x+2} dx$$

31.

$$\int_0^{\frac{\pi}{2}} \frac{\sin(x + 2\sqrt{e} \tan x)}{\sin x} dx$$

32.

$$\int_0^\infty \frac{1}{(x + \sqrt{1+x^2})^{2023}} dx$$

33.

$$\int_0^\pi \ln(1 + \sin^2 x) dx$$

34.

$$\int_0^\infty \frac{x-1}{\sqrt{2^x-1} \ln(2^x-1)} dx$$

35.

$$\int_0^{\frac{\pi}{4}} \sqrt{\tan x} \sqrt{1 - \tan x} dx$$

36.

$$\int_1^\infty \frac{(\ln x)^{1728}}{x^{2024}} dx$$

37.

$$\int_{-\infty}^\infty \frac{1}{x^2 + \sec^2 x + 2x \tan x} dx$$

38. 
$$\int_0^{\infty} \frac{1}{\sqrt{x}(x^2 + (\pi - 2)x + 1)(1 - x + x^2 - \dots + x^{2022} - x^{2023})} dx$$

39. 
$$\int_0^{\infty} \frac{1}{(1 + x^\phi)^\phi} dx \quad \text{where } \phi = \frac{1 + \sqrt{5}}{2}$$

40. 
$$\int_0^{\infty} \frac{\ln x}{1728x^2 + 2024x + 1728} dx$$

41. 
$$\int_0^{\frac{\pi}{2}} \frac{\cos x}{2 - \sin 2x} dx$$

42. 
$$\int_0^{\pi} \frac{\ln(1 + \cos x)}{\cos x} dx$$

43. 
$$\int_0^{\frac{\pi}{12}} \sin^2 \left( x - \sqrt{\frac{\pi^2}{144} - x^2} \right) dx$$

44. 
$$\int_0^{\pi} \ln(5 - 4 \cos x) dx$$

45. 
$$\int_0^{\frac{\pi}{2}} \frac{\arctan(\sin x)}{\sin x} dx$$

46. 
$$\int_0^1 \frac{\ln(1 + x - x^2)}{x} dx$$

47. 
$$\int_0^{\frac{\pi}{4}} \ln(\sin x + \cos x + \sqrt{\sin 2x}) dx$$

48. 
$$\int_0^{\frac{\pi}{2}} \arctan(1 - \sin^2 x \cos^2 x) dx$$

49. 
$$\int_0^{\frac{\pi}{2}} \frac{\arctan \left( \frac{2 \sin x}{2 \cos x - 1} \right) \sin \left( \frac{x}{2} \right)}{\sqrt{\cos x}} dx$$

50. 
$$\int_0^1 \frac{\arctan(\sqrt{x^2 + 2})}{\sqrt{x^2 + 2}(x^2 + 1)} dx$$