

Integrals

Bonn Integration Bee

May 18, 2025

This file contains all the integrals from the Bonn Integration Bee 2025

Kahoot

1.

$$\int 2025BIBee \, de$$

2.

$$\int_0^{2025} \lfloor x \rfloor \, dx$$

3.

$$\int_0^{\frac{\pi}{2}} \sin x \sin 2x \, dx$$

4.

$$\int_0^{\pi/2} \frac{\cos(x)}{1 + \sin(x)} dx$$

5.

$$\int_{-\pi}^{\pi} \lfloor \sin(\lfloor x \rfloor) \rfloor \, dx$$

6.

$$\int_0^{\pi} \sin^{2025}(x) \cos^{2025}(x) dx$$

7.

$$\int_0^1 \lfloor 4x(1-x) \rfloor \, dx$$

8.

$$\int_0^1 dx_1 \int_0^{x_1} dx_2 \cdots \int_0^{x_{2024}} dx_{2025}$$

9.

$$\int_1^e \frac{\cos(1 + \ln(x))}{x} \, dx$$

10.

$$\int_0^{\frac{\pi}{2}} \min(\sin x, \cos x) \max(\tan x, 1) \, dx$$

11.

$$\int_0^1 \frac{\arcsin(x)}{\sqrt{1-x^2}} \, dx$$

12.

$$\int_{\frac{1}{e}}^1 x^{\frac{1}{\ln(x)}} \, dx$$

13.

$$\int_0^{4\pi} \sin(\sin x - x) \, dx$$

14.

$$\int_0^\infty \frac{x^{1011}}{1+x^{2024}} \, dx$$

15.

$$\int_{-\infty}^0 e^{e^x+x} \, dx$$

16.

$$\int_0^\infty \frac{e^{-x}}{e^{-x}+2025} \, dx$$

17.

$$\int_0^1 45x^{45} \, dx$$

18.

$$\int_0^e \ln(x^2) \, dx$$

19.

$$\lim_{N \rightarrow \infty} \int_0^1 \sum_{i=1}^N \frac{1}{i} x^{i-1} \, dx$$

20.

$$\int_{\frac{1}{2025}}^{2025} e^{x+\frac{1}{x}} \frac{\log_{2025} x}{x} \, dx$$

21.

$$\int_0^2 1+2x+3x^2+4x^3+5x^4+6x^5 \, dx$$

22.

$$\int_1^e \frac{\ln(\ln x + 1)}{x} \, dx$$

23.

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

24.

$$\int_0^{\frac{\pi}{2}} \cot x - x \csc^2 x \, dx$$

25.

$$\int_0^{\frac{\pi}{2}} (x^4 - 4\pi x^3 + 6\pi^2 x^2 - 4\pi^3 x + \pi^4) \, dx$$

Quarterfinals

First leg

1.

$$\int \tan^3(\sin x) \cos x \, dx$$

2.

$$\int_1^\infty \frac{1}{x^2 + x + 1} + \frac{1}{x^3 + x^2 + x} + \frac{1}{x^4 + x^3 + x^2} \, dx$$

3.

$$\int_0^\infty 2x^2 e^{-x^2} \, dx$$

4.

$$\int_0^{\frac{3}{4}} \operatorname{arsinh} x \, dx$$

5. Tiebreaker 1

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

6. Tiebreaker 2

$$\int_0^1 (1-x)(1+x+x^2+x^3+x^4+x^6+x^7) \, dx$$

Second leg

1.

$$\int_0^\pi \sin^2 x \cos^2 x \, dx$$

2.

$$\int_0^{\frac{\pi}{2}} \sin x \sinh x \, dx$$

3.

4.

5. Tiebreaker 1

6. Tiebreaker 2

Semifinals

1.

2.

3.

4.

5. Tiebreaker 1

6. Tiebreaker 2

Third Place Playoff

1.

$$\int_0^\infty \frac{1+x^2}{1+x^4} dx$$

2.

$$\int_0^{\frac{3}{4}} 2x \operatorname{arsinh} x + \sqrt{x^2 + 1} dx$$

3.

$$\int_{-\log 2}^0 \sqrt{1 - e^x} dx$$

4.

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

5. Tiebreaker 1

$$\int_{e^2}^{e^4} \log_x(2) \log_{\log x}(4) \log_{e^x}(8) dx$$

6. Tiebreaker 2

$$\int_0^1 \min(2x^2 - 1, 1 - x^2) dx$$

Epic Finale

1.

$$\int_0^1 \ln(1 + \sqrt[3]{x}) dx$$

2.

$$\int_{\frac{1}{2}}^1 \frac{1}{x^2} \sqrt[3]{\frac{x}{1-x}} dx$$

3.

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

4.

$$\int_0^1 \frac{x^2}{\sqrt{x^2 + 3}} dx$$

5. Tiebreaker 1

$$\int_0^{\frac{\pi}{2}} \sin(51x) \cos(24x) dx$$

6. Tiebreaker 2

$$\int_2^3 \frac{x^2 + 2026x + 2025}{x^2 + 2024x - 2025} dx$$

Reserves for the case of the integrals being too easy

This just won't happen.

1.

$$\int_0^{2\pi} \log\left(\frac{5}{4} + \cos(t)\right) dt$$

Removed Integrals

1.

$$\int_0^1 \sqrt{\frac{\sqrt{x^5}}{1 - \sqrt{x^3}}} dx$$

2.

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