Integration Bee Qualifiers

HMMT February 2026

February 13, 2026
7:00 - 9:00 PM

Instructions

- You will have **30 minutes** to complete **20 integration problems**.
- Each integral, except for the last question which serves as the tiebreaker, is worth equal points.
- All logarithms are base e.
- You may omit the constant of integration (i.e., the $+C$) or the absolute values in the logarithms for indefinite integrals.
- You may leave your answers unsimplified, as long as they don't contain integrals, summations, or limits.

Do NOT turn over until you are told to begin.

©2026 HMMT

Integration Bee Qualifiers

HMMT February 2026

---

1 $\left\lceil \int_0^1 \sqrt{10000x}\, dx \right\rceil$

2 $\int_{20}^{26} |20 - x| - |26 - x|\, dx$

3 $\int_0^2 2^x - x^2\, dx$

4 $\int \sin(2x) \cdot e^{\sin^2 x} \cdot e^{\cos^2 x}\, dx$

5 $\int \left(\sqrt[x]{e}\right)^{x^3 \log\left(\sqrt[x]{3}\right)}\, dx$

6 $\int_{-6/7}^{6/7} \frac{\lceil -x \rceil}{x^2 + 2x + 1}\, dx$

7 $\int_{-2}^{2} \min(x + 2, 4 - x)\, dx$

8 $\int_0^1 \frac{1}{\sqrt{\left(\frac{1}{x} - x\right)\left(\frac{1}{x} + x\right)}}\, dx$

9 $\int \sin(2x)(e^{\sin^2 x} + e^{\cos^2 x})\, dx$

10 $\int_0^{\frac{\pi}{2}} \min(\sin x, 1 - \sin x) + \max(\cos x, 1 - \cos x)\, dx$

11 $\int \frac{\sin^3 x + \cos^3 x}{\sin(2x) - 2}\, dx$

12 $\int_0^1 (1 + x) \log(1 + 2x + x^2)\, dx$

13 $\int \frac{\tan(\log x) - \sec^2(\log x)}{x^2}\, dx$

14 $\int \frac{x^4 - 3x - 3}{x^3 - 3x - 3}\, dx$

15 $\int (\log x)^{\log x} (\log \log x + 2)\, dx$

16 $\int_0^2 \sqrt{x^3 + 1} + \sqrt[3]{(x + 1)^2 - 1}\, dx$

17 $\int_0^1 e^{-x^2} + \frac{e^{-1/x^2}}{x^2}\, dx$

18 $\int_0^\infty \frac{\log x \cdot \arctan x}{x^2 - 1}\, dx$

19 $\int_0^\infty \frac{\lfloor x \rfloor \{x\}}{x^3}\, dx$

20 Estimate

$$\int_0^{2\pi} (0.5 + \sin x)^{20}\, dx.$$

(For the tiebreaker, if you answer A and the answer is actually B, your score will be $\min(A/B, B/A)$. **You may submit your guess unevaluated**, like $\pi^{10}/2025$.)

©2026 HMMT

Integration Bee Finals

HMMT February 2026

February 14, 2026

Format

- **2 minutes** per integral.
- We will check the result after two minutes.
- **Semifinal:** best of 3 integrals.
- **Final:** best of 5 integrals.
- If there is a tie, we will run a sudden death round.
- All logarithms are base e.
- You may omit the constant of integration (i.e., the $+C$) or the absolute values in the logarithms for indefinite integrals.
- You may leave your answers unsimplified, as long as they don't contain integrals, summations, or limits.

©2026 HMMT

Integration Bee Finals

HMMT February 2026

Sample

1 $\displaystyle\int_0^1 2026x\,dx$

2 $\displaystyle\int_0^1 x^{2026}\,dx$

Semifinal 1

1 $\displaystyle\int \sqrt{1+\tfrac{1}{x^2}+\tfrac{1}{(x+1)^2}}\,dx$

2 $\displaystyle\int \frac{1}{1+2\tan x}\,dx$

3 $\displaystyle\int (\sin x-\cos x)^{2026}\cos(2x)\,dx$

Semifinal 2

1 $\displaystyle\int_0^\infty \frac{\cos x}{x}-\frac{\sin x}{x^2}\,dx$

2 $\displaystyle\int e^x(x^2+2x)\left(\log x+\frac{1}{x}\right)\,dx$

3 $\displaystyle\int \frac{\sqrt{\sin x}}{\cos x}\,dx$

Audience Round

1 $\displaystyle\int_0^1 \cos(1000\arccos x)\,dx$

Final

1 $\displaystyle\int\int_0^x \frac{\sec y\tan y+\sec^2 y}{(\sec y+\tan y)^2+1}\,dy\,dx$

2 $\displaystyle\int_0^1 (2x^2\cos(x^2)+\sin(x^2))\,dx$

3 $\displaystyle\left\lceil\int_0^1 2020\sqrt{x^{202}+1}\,dx\right\rceil$

4 $\displaystyle\int_{-1}^1 \arctan\left(\frac{x-1}{x+1}\right)\,dx$

5 $\displaystyle\int_0^{10}\sqrt{x^2-\frac{5}{4}+\sqrt{(x+1)^2-\frac{5}{4}+\ldots}}\,dx$

Sudden Death

1 $\displaystyle\int_0^\pi \left|\tfrac{1}{2}+\sin x\right|+\left|\tfrac{1}{2}-\sin x\right|\,dx$

2 $\displaystyle\int_0^1 (x\log x)^3\,dx$

3 $\displaystyle\int_0^e \sin(\log x)+\cos(\log x)\,dx$

4 $\displaystyle\int \frac{x^{1/3}}{x^{2/3}+1}\,dx$

5 $\displaystyle\int_1^e e^{(\log x)^{2026}}+e^{(\log x)^{1/2026}}\,dx$

©2026 HMMT