Integration Bee Qualifiers

HMMT November 2026

November 6, 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, products, or limits.

Do NOT turn over until you are told to begin.

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1 $\displaystyle\int \sqrt{\sqrt{x}+x^{0.5}}\,dx$

2 $\displaystyle\int_0^{10} \lfloor \{x^2\} \rfloor - \{\lfloor x^2 \rfloor\}\,dx$

3 $\displaystyle\int \frac{x}{x+\frac{x}{x+\frac{x}{x}}}\,dx$

4 $\displaystyle\int e^x \cdot e^{e^x} \cdot e^{e^{e^x}}\,dx$

5 $\displaystyle\int_0^{\pi} \min(\sin^2 x, \cos^2 x) - \min(-\sin^2 x, -\cos^2 x)\,dx$

6 $\displaystyle\int \frac{\sin x + \cos x}{e^x}\,dx$

7 $\displaystyle\int x^3 e^{3x^2}\,dx$

8 $\displaystyle\int x^6(x+1)^6(2x+1)\,dx$

9 $\displaystyle\int_{-\pi}^{\pi} \frac{e^x + \sin x}{e^x + e^{-x}}\,dx$

10 $\displaystyle\int \sqrt{x^{-0.4}+x^{0.4}}\,dx$

11 $\displaystyle\int_0^1 \frac{x^2 - x - 1}{\sqrt{1-x^2}}\,dx$

12 $\displaystyle\int (1 + x + x\log x)x^x\,dx$

13 $\displaystyle\int_0^{1000} \left\lfloor 10^{2026}\binom{x}{1001} \right\rfloor\,dx$

14 $\displaystyle\int \frac{2\log x - \log^2 x}{x^2 + x\log^2 x}\,dx$

15 $\displaystyle\int_0^1 \frac{2\sin(x^2)}{x} + \log x \cos x\,dx$

16 $\displaystyle\int_0^{\pi/2} \cos x \log\left(1+\cos^2 x\right)\,dx$

17 $\displaystyle\int_0^{\pi/2} \max\left(\frac{\sin^2 x}{\cos^2 x + 1}, \frac{\cos^2 x}{\sin^2 x + 1}\right)\,dx$

18 $\displaystyle\int_0^1 \frac{\log(x - x^2)}{\sqrt{x - x^2}}\,dx$

19 $\displaystyle\int_0^{\infty} \frac{(1 - e^{-x})\sin x}{x^2}\,dx$

20 Estimate

$$\int_{6^{-7}}^{6^7} 67^{x^6 - x^7}\,dx$$

(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 $\pi^{10}/2026$.)

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Integration Bee Finals

HMMT November 2026

November 7, 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.

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Integration Bee Finals

HMMT November 2026

Sample

1 $\displaystyle\int_0^1 2026\text{🐴}\,d\text{🐴}$

2 $\displaystyle\int_0^1 \text{🐴}^{2026}\,d\text{🐴}$

Semifinal 1

1 $\displaystyle\int \sin x \log(1+\sin x)\,dx$

2 $\displaystyle\int \frac{(e^x-1)(e^{2x}-1)}{e^{3x}-1}\,dx$

3 $\displaystyle\int_{-\infty}^{\infty} \{x\}e^{-x^2}\,dx$

Semifinal 2

1 $\displaystyle\int_0^{\frac{\pi}{2}} \sin(2x)(\sin^{20}x+\cos^{26}x)\,dx$

2 $\displaystyle\int \frac{xe^x-1}{e^{e^x}-x}\,dx$

3 $\displaystyle\int_0^{\pi/4} \frac{1}{(\sec x+\tan x)^2}\,dx$

Audience Round

1 $\displaystyle\int_0^1 (1001x^{1000}+999x^{998})\arctan x\,dx$

Final

1 $\displaystyle\int \frac{4\sec^2 x-(e^x+e^{-x})^2}{4\tan^2 x-(e^x-e^{-x})^2}\,dx$

2 $\displaystyle\int \tan(\arctan(\cos x)-\arctan(\sin x))\,dx$

3 $\displaystyle\int_0^1 \sqrt{2x+\sqrt{2x^2+\sqrt{2x^4+\sqrt{2x^8+\cdots}}}}\,dx$

4 $\displaystyle\int_0^{\pi/2} \begin{aligned}&\cos x\sin(\sin x)\sin(\cos x)\\&\quad+\sin x\cos(\sin x)\cos(\cos x)\end{aligned}\,dx$

5 $\displaystyle\int_1^{\frac{5}{4}} \sqrt{\sqrt{x-1}+\sqrt{x+1}}\,dx$

Sudden Death

1 $\displaystyle\int_{-2}^{2} |x^3-|x||\,dx$

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

3 $\displaystyle\int_{-2}^{2} \text{median}(x,x^2,x^3)\,dx$

4 $\displaystyle\int_0^{\pi/4} \frac{\tan x}{\cos x+1}\,dx$

5 $\displaystyle\int_0^1 \cos(x^2+x)+\cos(x+\sqrt{x})\,dx$

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