Integration Bee Answer Key

HMMT February 2025

Qualifiers

1. 2025
2. 0
3. $\pi + \sqrt{3}$
4. $\dfrac{x^{\log_3 6}}{\log_3 6}$
5. $\dfrac{2^{2^x}}{\log^2 2}$
6. $\dfrac{\pi}{2}$
7. $x - \log(x^2 + 2x + 2)$
8. $-x^{-x}$
9. $\log(\tan x - x)$
10. $\dfrac{1}{3}(x^2+1)^{3/2} - \dfrac{x^3}{3}$
11. $x - (e^{-x} + 1)\log(e^x + 1)$
12. $\dfrac{\pi^2}{2}$
13. 1
14. $-\dfrac{\pi}{2}$
15. $\dfrac{1}{2}e^{(\log x)^2}$
16. $\dfrac{2\pi}{\sqrt{3}}$
17. $-\dfrac{\pi \log(2)}{4}$
18. $\log(\cos(x)) + \dfrac{1}{2}\log(\cos(2x)) - \dfrac{1}{3}\log(\cos(3x))$
19. $-\dfrac{\pi^2}{24}$
20. 10697.1326

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Finals

Sample

[1] $\frac{2025}{2}$

[2] $\frac{1}{2026}$

Semifinal 1

[1] $(x+1)\arctan\sqrt{x}-\sqrt{x}$

[2] 2025

[3] $\frac{\pi-2}{2}$

Semifinal 2

[1] $x-\log(x+e^x)$

[2] $\log(x)\log(1+x)$

[3] 65

Audience Round

[1] $-\frac{\pi}{4}$

Final

[1] $-\frac{25}{441}$

[2] 0

[3] $2\sqrt{2}-2$

[4] $\sin(x)-\cos(x)-\frac{1}{\sqrt{2}}\log\left(\tan\left(\frac{x}{2}+\frac{\pi}{8}\right)\right)$

[5] $2^{11/4}$

Sudden Death

[1] $\frac{\pi}{2}$

[2] $\arctan(x\log x)$

[3] $-\frac{1+\log(x)}{x}$

[4] $\frac{\pi}{2\sqrt{2}}$

[5] $\frac{\sin\left(x^{1013}\right)-x^{1013}\cos\left(x^{1013}\right)}{1013}$

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