Integration Bee Answer Key

HMMT November 2023

Qualifiers

1. 2023
2. $\frac{1}{2} + \ln(2)$
3. $\frac{\pi}{2}$
4. $\frac{\pi}{8}$
5. $\frac{x^5}{5} + 2x - \frac{x^{-3}}{3}$
6. $\frac{2\sqrt{2}-1}{3}$
7. $\frac{\sin^{10}(x)}{5}$
8. $\frac{2}{9}((x+23)^{3/2} - (x+20)^{3/2})$
9. $\frac{2}{7}(x+1)^{7/2} - \frac{4}{3}(x+1)^{3/2}$
10. $-\ln(\cos(x+1))$
11. $-\sqrt{1-x^2}$
12. 2023
13. $\frac{2023}{2}$
14. 1
15. $\frac{\arctan^2(x)}{2}$
16. $x - \ln(1 + 2023e^x)$
17. $\frac{1}{2}\arctan\left(\frac{\sin x}{2}\right)$
18. 95
19. $\ln(2024)$
20. 54.7994

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Finals

Sample

[1] $\frac{2023}{2}$

[2] $\frac{1}{2024}$

Semifinal 1

[1] $x + \ln(x^2 + 1)$

[2] $3(x+1)\ln(x+1) - 3x$

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

Semifinal 2

[1] $\frac{3}{2}$

[2] $\ln(2)$

[3] $\frac{1}{4}x^4(x-1)^4$

Third Place

[1] $\frac{11}{6}$

[2] $\frac{2}{3}x^3 - x$

[3] $x(\ln x)^3$

Final

[1] 1

[2] $2x - \tan(x)$

[3] $-x^{-x}$

[4] $\ln(2)$

[5] $\frac{19}{6}$

Sudden Death

[1] $\frac{3-\sqrt{5}}{2}$

[2] 6

[3] 2

[4] $\ln(4)$

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