

THE UK UNIVERSITY INTEGRATION BEE

2022/23



ROUND ONE TIEBREAKER

Monday, 12 December 2022



Sponsored by



Jane Street

1. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\cos x}{1 + e^x} dx$
2. $\int \sqrt{x \sqrt{x^3 \sqrt{x^4 \sqrt{x^5 \sqrt{x \cdots}}}}} dx$
3. $\int_0^1 x^{\frac{1}{\ln x}} dx$
4. $\int e^{x+e^x} dx$
5. $\int_0^1 \ln \left(\frac{1+x}{1-x} \right) dx$
6. $\int_0^\infty \frac{1}{1 + e^{ax}} dx$
7. $\int_0^{2\pi} \sin(\sin(x) - x) dx$
8. $\int_0^{\frac{\pi}{2}} \frac{dx}{\tan^{\sqrt{2}}(x) + 1}$
9. $\int_0^\infty \frac{\arctan x}{1+x} \frac{dx}{\sqrt{x}}$
10. $\int_1^{\sqrt{3}} \frac{\arctan x + \operatorname{arccot} x}{x} dx$
11. $\int \frac{\ln(2x)}{x \ln x} dx$
12. $\int_0^\infty x^{2n} e^{-x^2} dx$
13. $\int_0^1 \sqrt{-\ln x} dx$
14. $\int_0^1 \frac{\ln(1+x)}{x} dx$
15. $\int_0^\infty \frac{x^2}{e^x - 1} dx$
16. $\int_0^\infty \frac{\ln(x^2 + 1)}{x^2 + 1} dx$
17. $\int_0^\infty e^{-x} \frac{\sin ax}{x} dx$
18. $\int_0^1 \ln(x) \sin(\ln(x)) dx$
19. $\int_0^{\frac{\pi}{2}} (\ln(\tan \theta))^2 d\theta$
20. $\int_0^{\frac{\pi}{2}} \frac{\cos x}{2 - \sin(2x)} dx$