THE UK UNIVERSITY INTEGRATION BEE 2022/23

$$\int$$

ROUND ONE MARK SCHEME

Sponsored by

Jane Street

1. π
2. 333300
3. 0
4. $\frac{5}{12}(1+\sqrt{5})$
5. $1-\gamma$
6. $\frac{\pi^2}{8}$
7. 1
8. $\frac{\pi \ln 2}{8}$
9. $\frac{\pi \sinh^{-1}(b)}{2}$
10. $\frac{7}{8}\Gamma(4)\zeta(4) = \frac{21}{4}\zeta(4) = \frac{7\pi^4}{120}$
11. $\frac{1}{2}$
12. $\frac{1}{2}\sqrt{\frac{\pi}{2}}$
13. $-\frac{\pi^2}{4}$
14. $-\frac{\pi}{2}$
15. $\frac{1}{4}(\pi-2)$
16. $1-\gamma$
17. $\pi \operatorname{sech}\left(\frac{\pi}{2}\right)$
18. $G + \frac{\pi \ln 2}{4}$
19. $\pi \sin^{-1}(\frac{1}{3})$
20. $\frac{\pi^2}{9}$
21. $\frac{e\sqrt{\pi}}{2}$
22. $\frac{\pi^2}{4}$
23. $\frac{\pi}{2\sqrt{2}}$
24. $\frac{2\pi}{n!}$

25. $\dfrac{-\gamma\pi}{2}$
26. $\ln\left(\dfrac{\pi}{2}\right)$
27. $\dfrac{\ln 2}{2}+\dfrac{\pi}{4}-1$
28. $4G$
29. $-\dfrac{\pi+2}{8}$
30. $\dfrac{\pi\ln^2(1+a)}{2a^2}$