

# THE UK UNIVERSITY INTEGRATION BEE

2022/23



## ROUND ONE MARK SCHEME



Sponsored by



**Jane Street**

1.  $\pi$
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.  $\pi \sin^{-1}\left(\frac{1}{3}\right)$
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.  $\frac{-\gamma\pi}{2}$

26.  $\ln\left(\frac{\pi}{2}\right)$

27.  $\frac{\ln 2}{2} + \frac{\pi}{4} - 1$

28.  $4G$

29.  $-\frac{\pi+2}{8}$

30.  $\frac{\pi \ln^2(1+a)}{2a^2}$