

# THE UK UNIVERSITY INTEGRATION BEE

2022/23



## TIEBREAKER MARK SCHEME

Monday, 12 December 2022



Sponsored by



**Jane Street**

1.  $\sin(1)$
2.  $\frac{x^{e-1}}{e-1}$
3.  $e$
4.  $e^{e^x}$
5.  $\ln(4)$
6.  $\frac{\ln 2}{a}$
7.  $0$
8.  $\frac{\pi}{4}$
9.  $\frac{\pi^2}{4}$
10.  $\frac{\pi}{4} \ln(3)$
11.  $\ln x + \ln 2 \log \log x$
12.  $\frac{(2n)!}{4^n n!} \frac{\sqrt{\pi}}{2}$
13.  $\frac{\sqrt{\pi}}{2}$
14.  $\frac{\pi^2}{12}$
15.  $2\zeta(3)$
16.  $\pi \ln 2$
17.  $\arctan(a)$
18.  $\frac{1}{2}$
19.  $\frac{\pi^3}{8}$
20.  $\frac{\pi}{4}$