

# THE UK UNIVERSITY INTEGRATION BEE

2022/23



## MIT 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.  $\frac{\sqrt{\pi}}{2}$
13.  $-\frac{\pi^2}{6}$
14.  $\frac{\pi^2}{4}$
15.  $4 \left( \sin \frac{x}{4} - \cos \frac{x}{4} \right)$
16.  $2 - \frac{\pi^2}{6}$
17.  $n!x - n! \log(1 + x + \dots + x^n/n!)$
18.  $\pi$
19.  $\sec x + \tan x$
20.  $\frac{1}{e-1}$
21.  $\ln 6$
22.  $\frac{\pi}{2^{2021}} \binom{2022}{1011}$
23.  $-2x \log 2$
24.  $0$
25.  $4$
26.  $\frac{1}{2}$

27.  $\frac{1}{2} \ln^2(\ln(x))$

28.  $\frac{\ln 2}{2}$

29.  $\frac{\pi}{4}$

30.  $\frac{\pi}{4}$