Solutions

2.1

- $8.94/2.24 = 3.99 \approx 4$ per halving: order 2.

2.2

- Trapezoid at 16: $2.24 \times 10^{-3}/4 = 5.6 \times 10^{-4}$.
- Simpson $3.70 \times 10^{-5} \to 2.33 \times 10^{-6}$: ratio $15.9 \approx 16$: order 4.

2.3

- Simpson from $n = 8$ needs $2.33 \times 10^{-6}/16 < 10^{-6}$: $n = 16$ suffices.
- Trapezoid from $n = 8$: $2.24 \times 10^{-3}/4^p < 10^{-6}$ needs $p \approx 5.6$ halvings - n near $2^{14} \approx 16{,}000$.

2.4

- Round-off: each panel adds floating-point noise of order 10^{-16}.
- Past $\sim 10^5$ panels the accumulated round-off ($\sim 10^{-10}$) exceeds truncation - the U-curve floor.

exercises.lol exercises.com.cn