**Question:** Find $\int_0^1 e^{-x^2}\,dx$ with an accuracy of $\pm 0.01$.

**Theorem: Trapezoidal rule**

If $f:[a,b] \to \mathbb{R}, f \in C^2, h = \frac{b-a}{n}, x_0 = a, x_n = b, x_k = a + kh: k = 0,1,\cdots,n$ and $n$ is the number of intervals

then $\int_a^b f(x)\,dx = \frac{h}{2}\left(f(x_0) + \sum_{k=1}^{n-1} f(x_k) + f(x_n)\right) - \frac{nh^3}{12} f''(c)$ where $c \in (a,b)$.