# prb5-1_errorSin

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if $\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots$

and approx. $\sin\left(\frac{1}{n}\right) \approx \frac{1}{n}$, then

order of error $\sin\left(\frac{1}{n}\right) \approx O(?)$

$$\text{error} = \sin\left(\frac{1}{n}\right) - \text{approx } \sin\left(\frac{1}{n}\right)$$

$$\text{error} = \frac{\frac{1}{n} - \frac{1}{n^3}{3!} + \frac{1}{n^5}{5!} - \frac{1}{n^7}{7!} - \frac{1}{n}}{}$$

$$\text{error } \sin\left(\frac{1}{n}\right) = -\frac{\frac{1}{n^3}}{3!} + \frac{\frac{1}{n^5}}{5!} - \frac{\frac{1}{n^7}}{7!}$$

Order of error is the leading or largest polynomial of degree, d.

$$p(n) = O\left(\frac{1}{n^d}\right)$$

$$d = 3$$