

## Infinite series for $\pi$

- ▶ The number today called  $\pi$  (= ratio of circumference to diameter) **requires** an infinite series.
- ▶ One such infinite series wrongly credited to Leibniz found in 16th c. *Yuktidīpikā* 2.271.

व्यासे वारिधिनिहते रूपहृते व्याससागराभिहते ।  
त्रिशरादिविषमसंख्याभक्तमृगां स्वं प्रिथक् क्रमात् कुर्यात् ॥ २.२७१ ॥

- ▶ Translation: To the diameter multiplied by 4 alternately add and subtract in order the diameter multiplied by 4 and divided separately by the odd numbers 3, 5, etc.

## “Leibniz” series

contd.

- ▶ Mathematical translation: if  $d$  is the diameter of the circle, then

$$\text{circumference} = 4d - \frac{4d}{3} + \frac{4d}{5} - \frac{4d}{7} + \dots \quad (3)$$

- ▶ This corresponds to the value of  $\pi$  given by

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots \quad (4)$$

- ▶ What baffled **all** Western thinkers (Descartes, Galileo, Newton, Berkeley ...) was this: how to do this infinite sum “perfectly”.