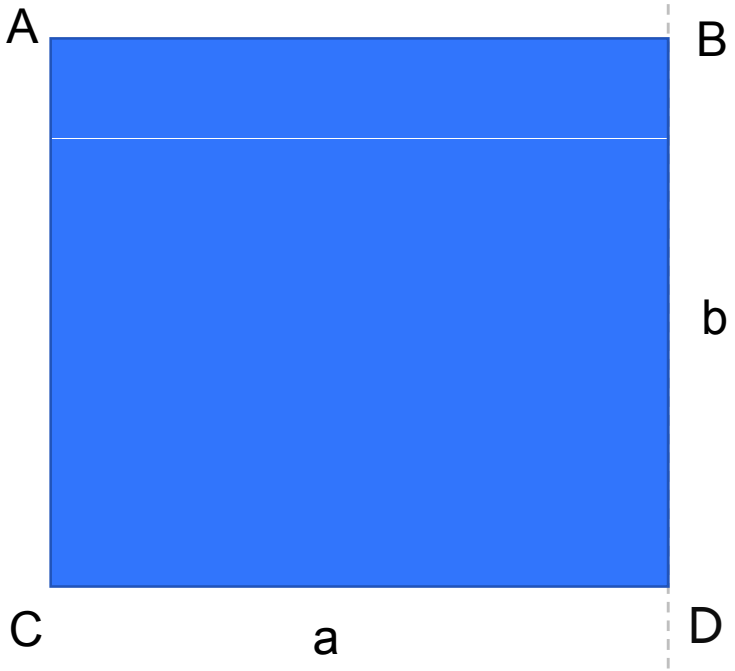
微积分是什么？

曹军

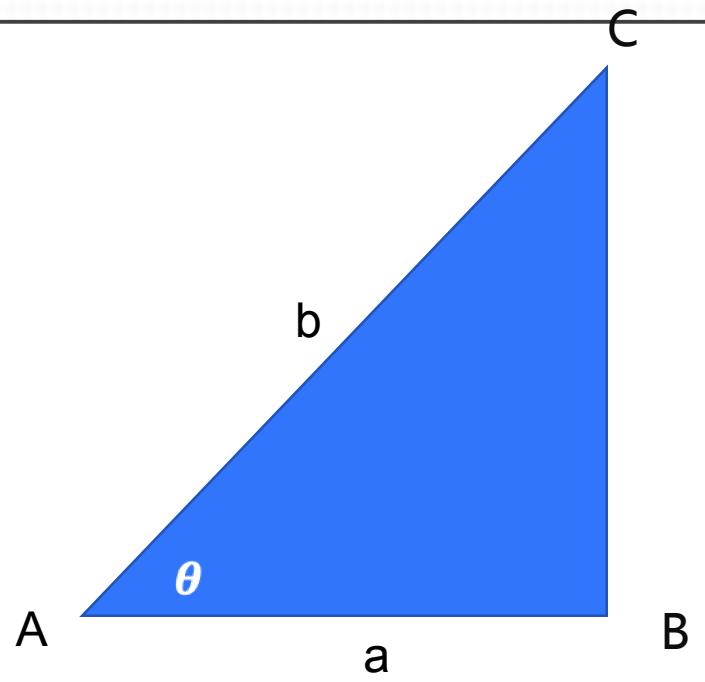
理学院数学系

面积

LOGO



S=ab



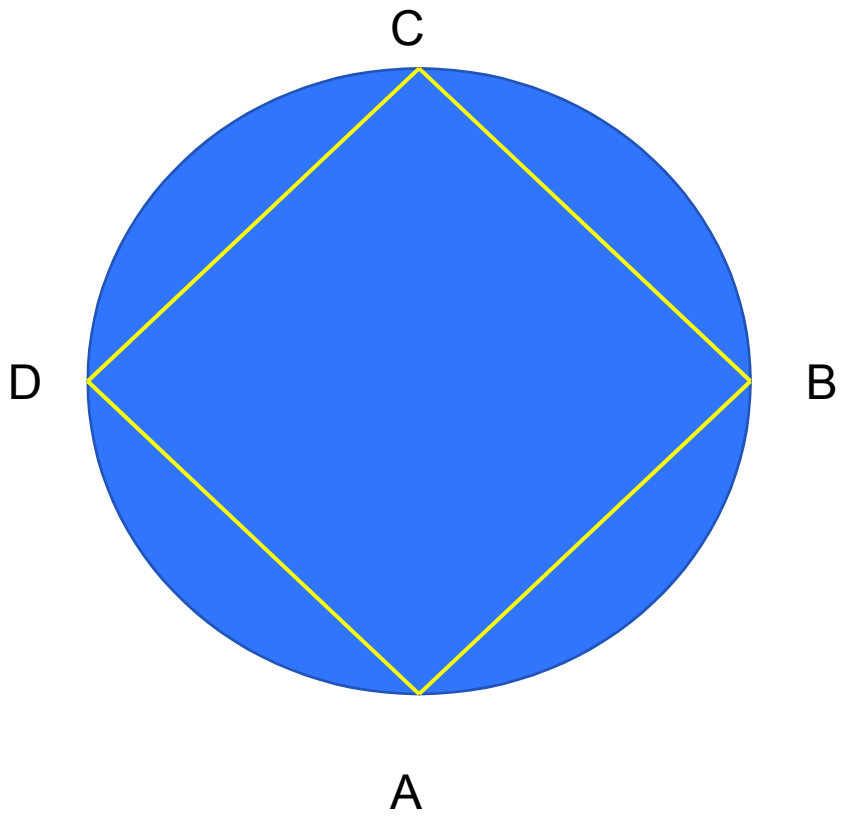
$S=\frac{ab}{2}$

$S=\frac{ab}{2}\sin\theta$

《兰德纸草书》

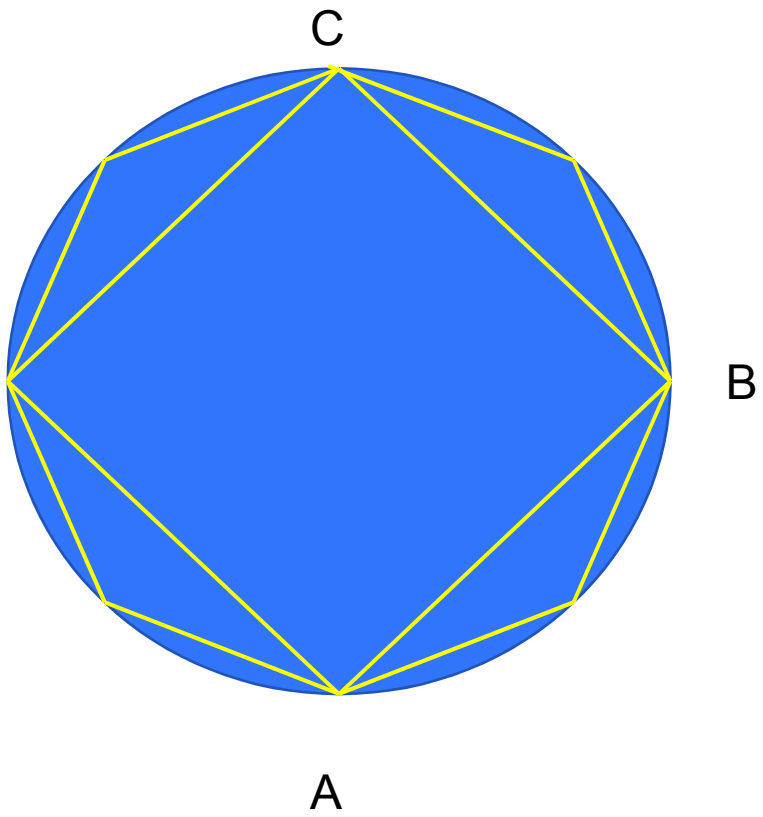
面积

LOGO



如何求圆的面积？

穷竭法

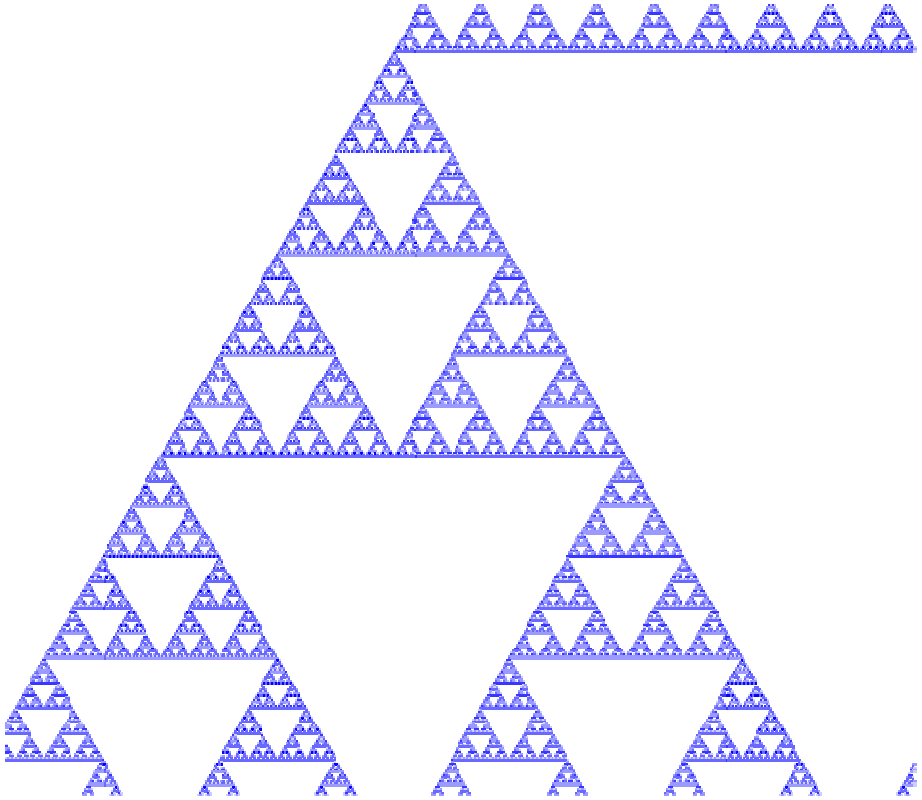


割圆术

刘徽

无穷

LOGO

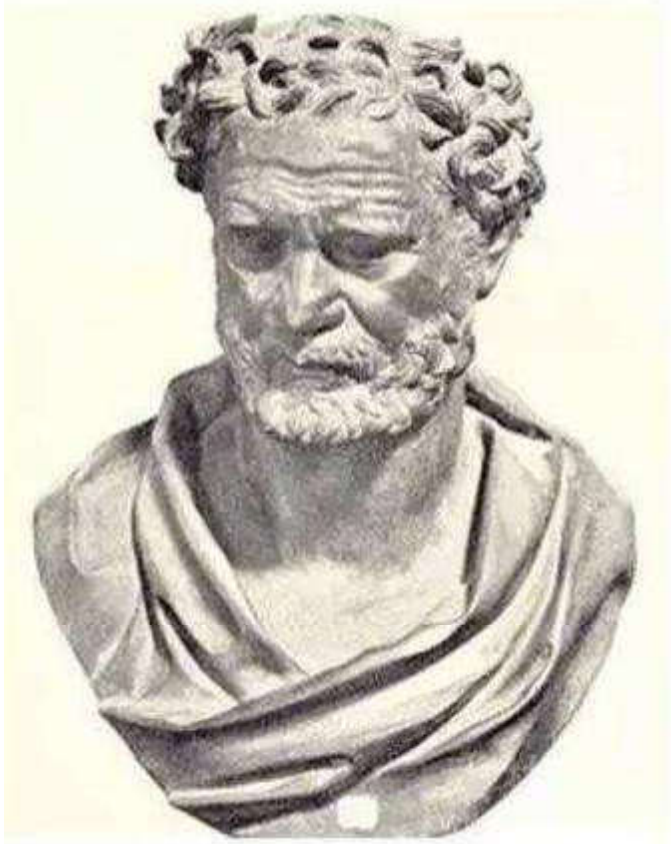


“ 一尺之捶，日取其半，万世不竭”

可分与不可分

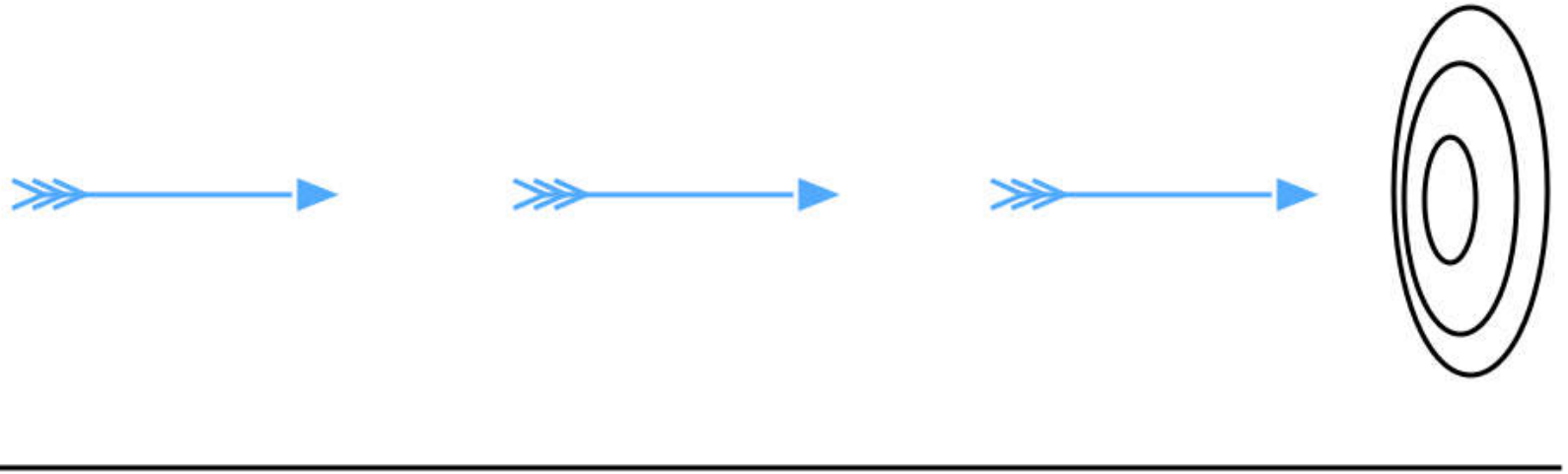
物质的无限可分

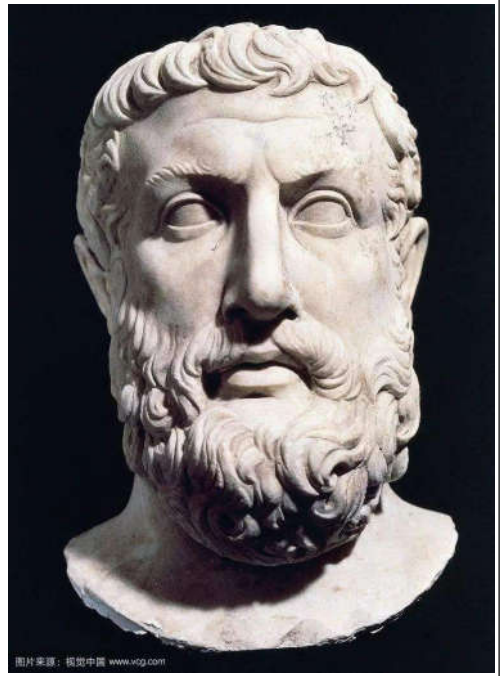
原子论



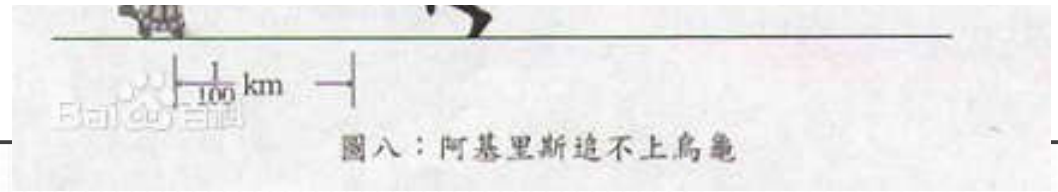
德谟克利特

之诺悖论





芝诺

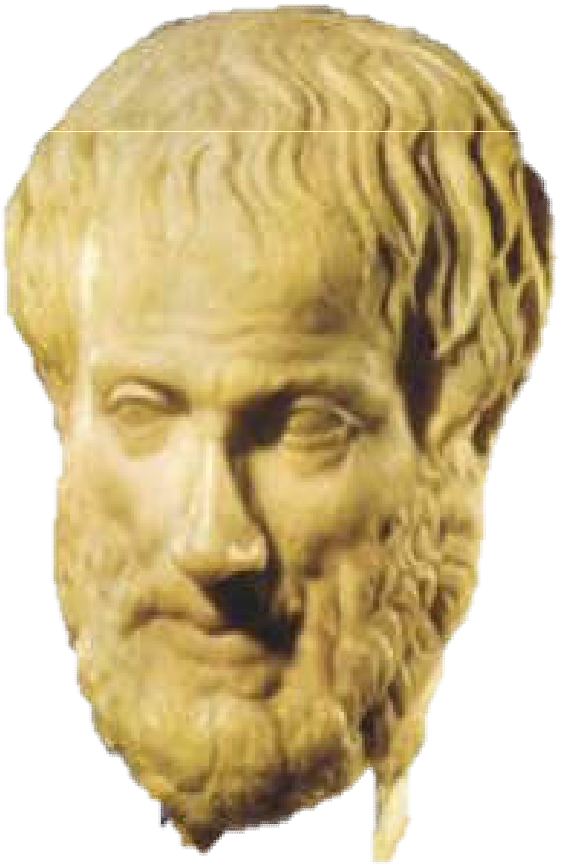


圖八：阿基里斯追不上烏龜

潜无穷

LOGO

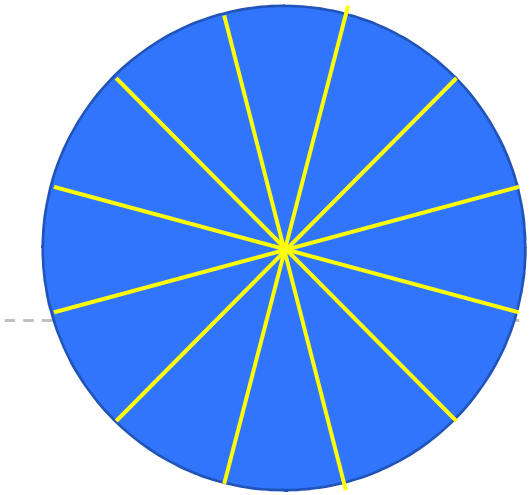
潜无穷与实无穷



亚里士多德

不可分量

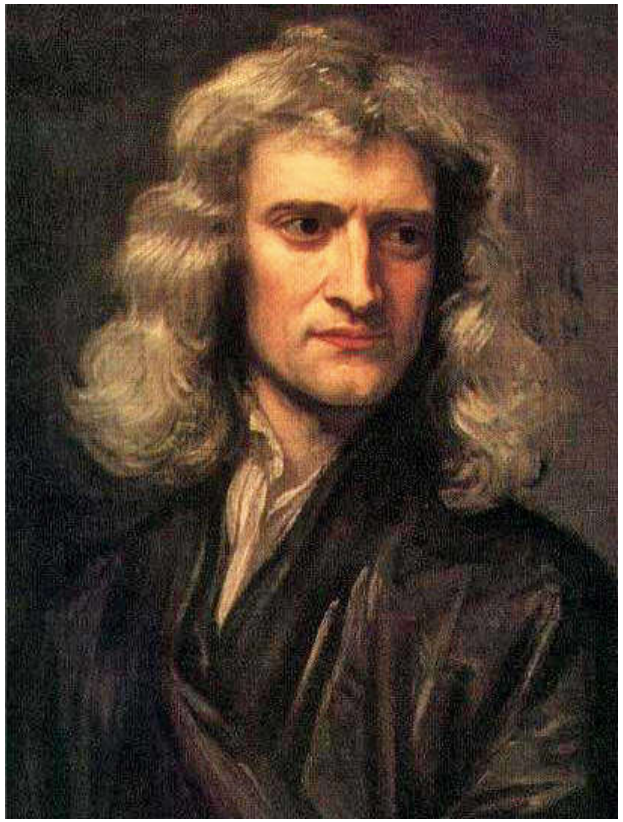
LOGO



$$S=\frac{\text{周长}*\text{半径}}{2}=\pi r^2$$

托马斯.布兰德瓦丁

牛顿与莱布尼茨

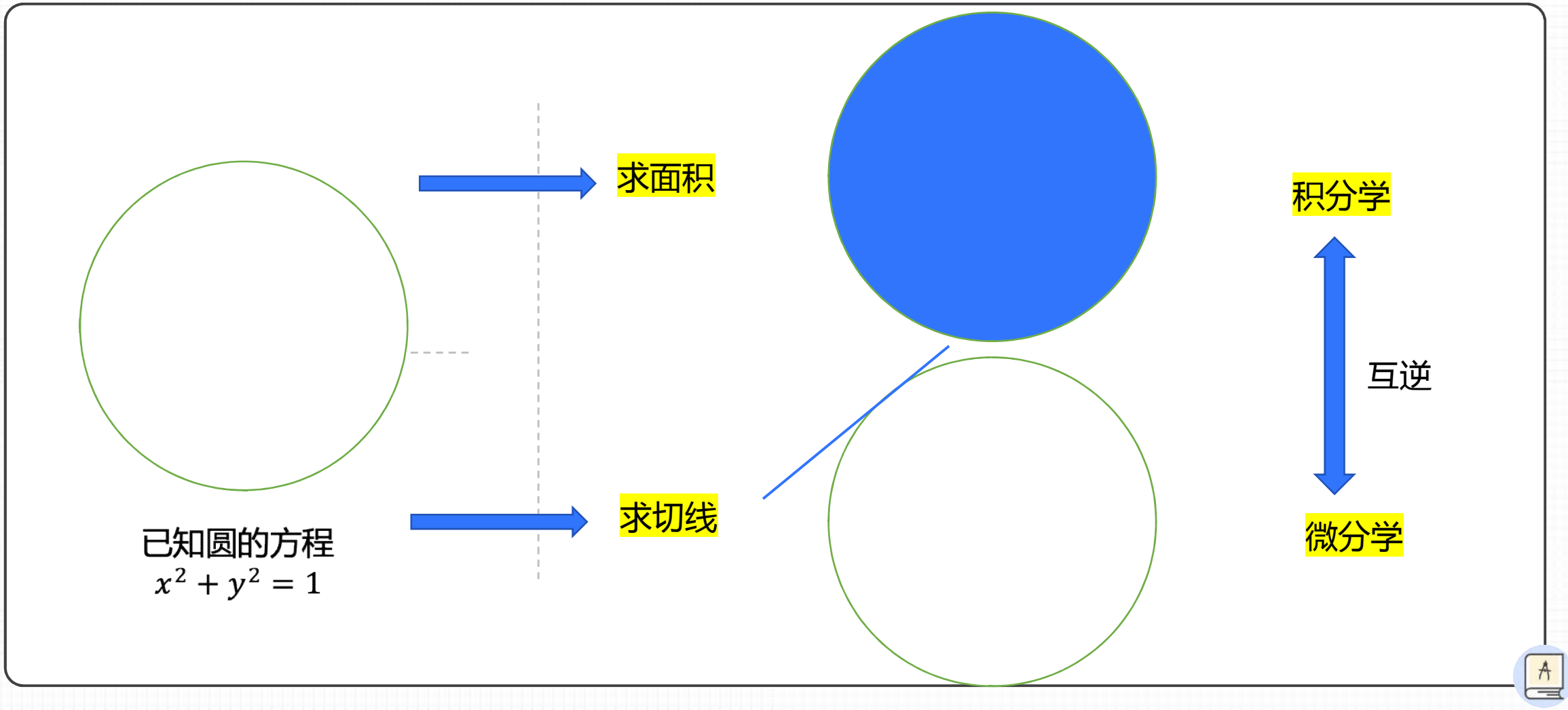


运动

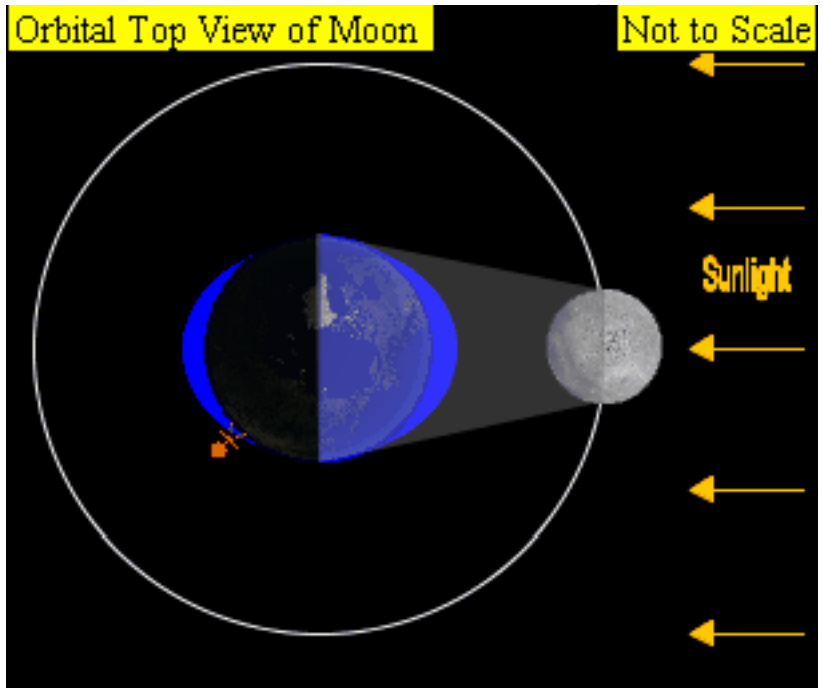
几何

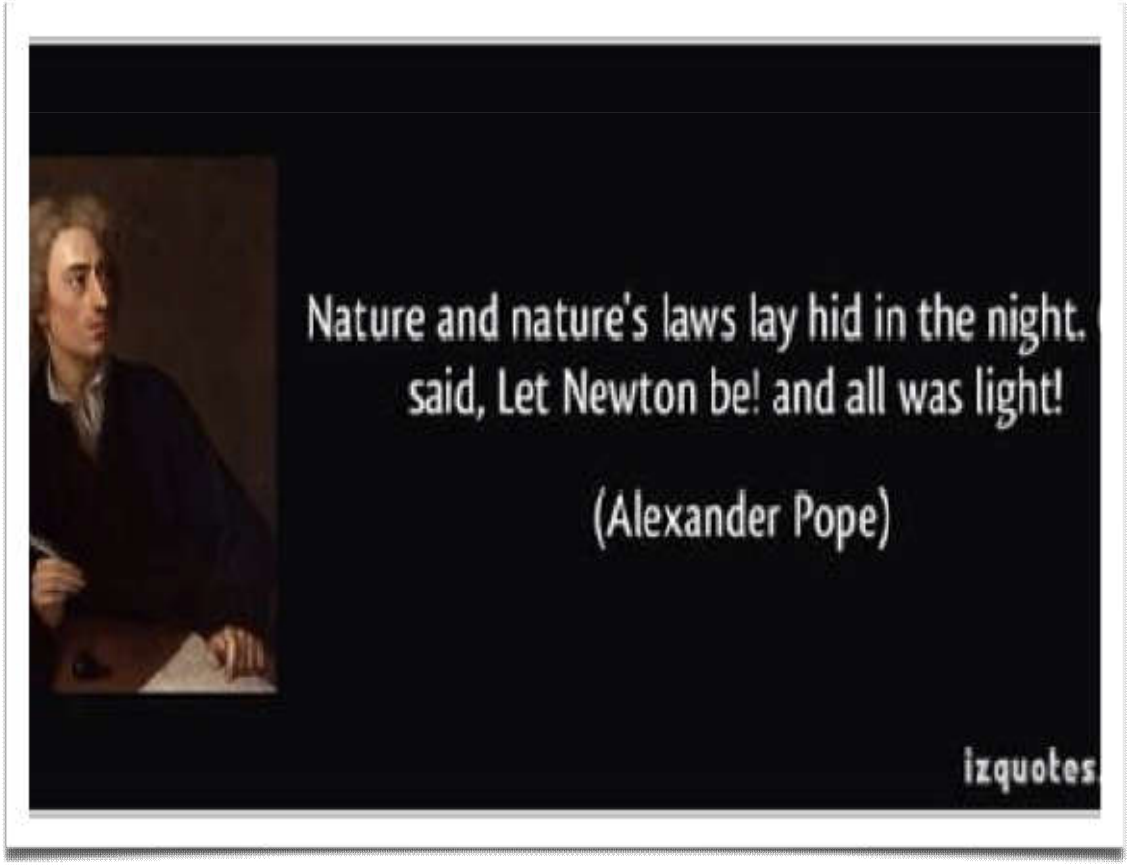
微积分

LOGO



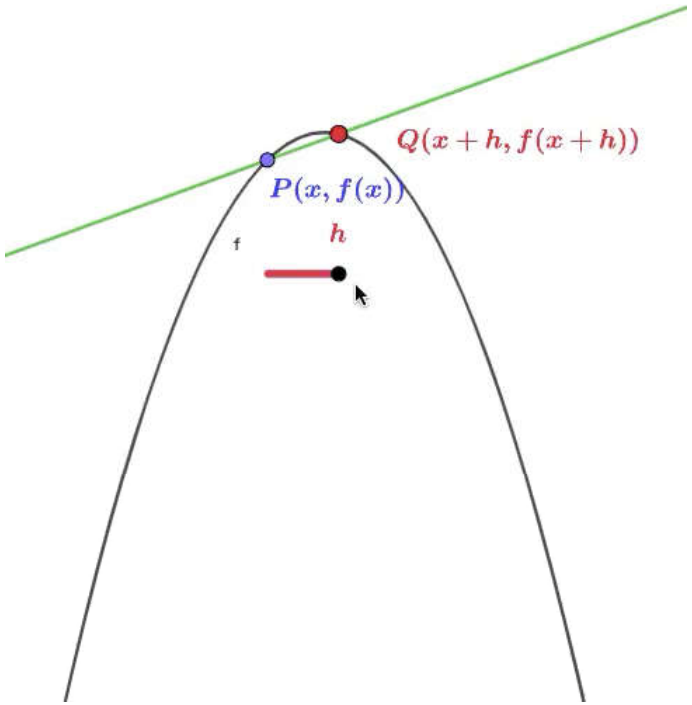
牛顿与莱布尼茨


Orbital Top View of Moon
Not to Scale
Sunlight

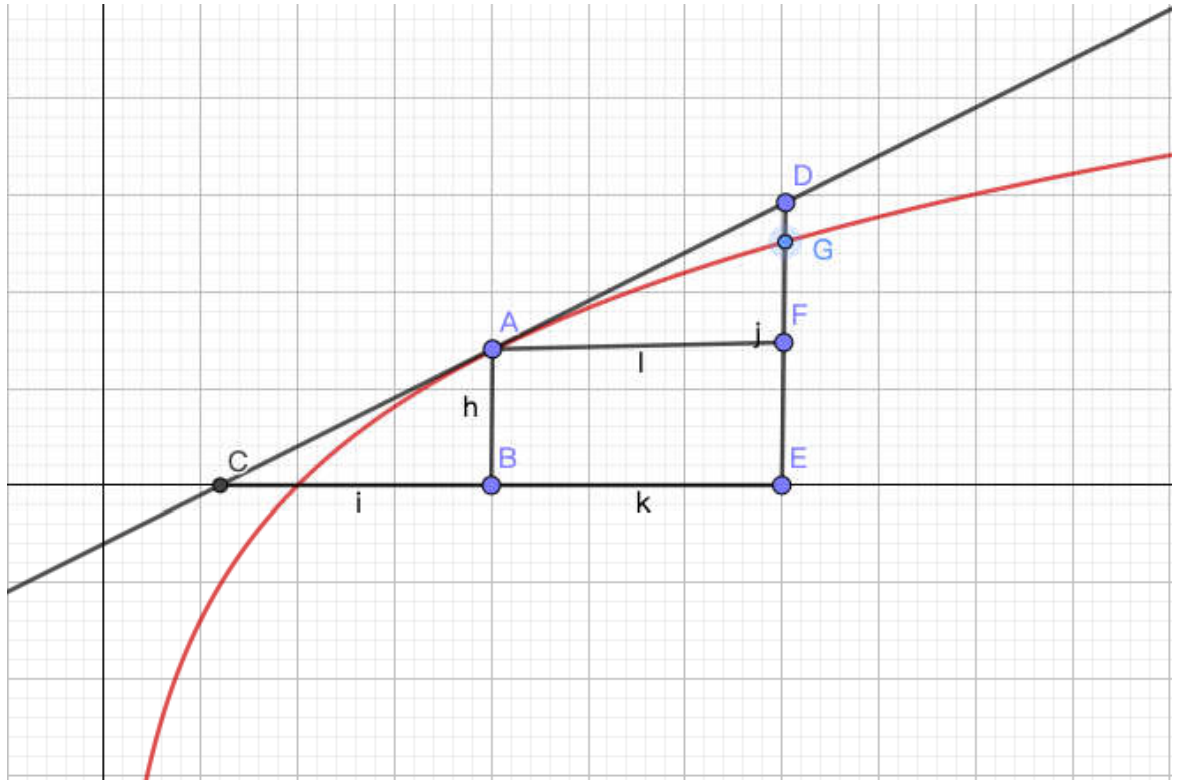

Nature and nature's laws lay hid in the night.
said, Let Newton be! and all was light!
(Alexander Pope)
izquotes

求切线

LOGO



求切线



$$\text{切线斜率}=\frac{AB}{BC}=\frac{DF}{AF}=\frac{DG+GF}{AF}=\frac{GF}{AF}$$

相似三角形

DG无穷小

贝克莱主教

“消失的幽灵”

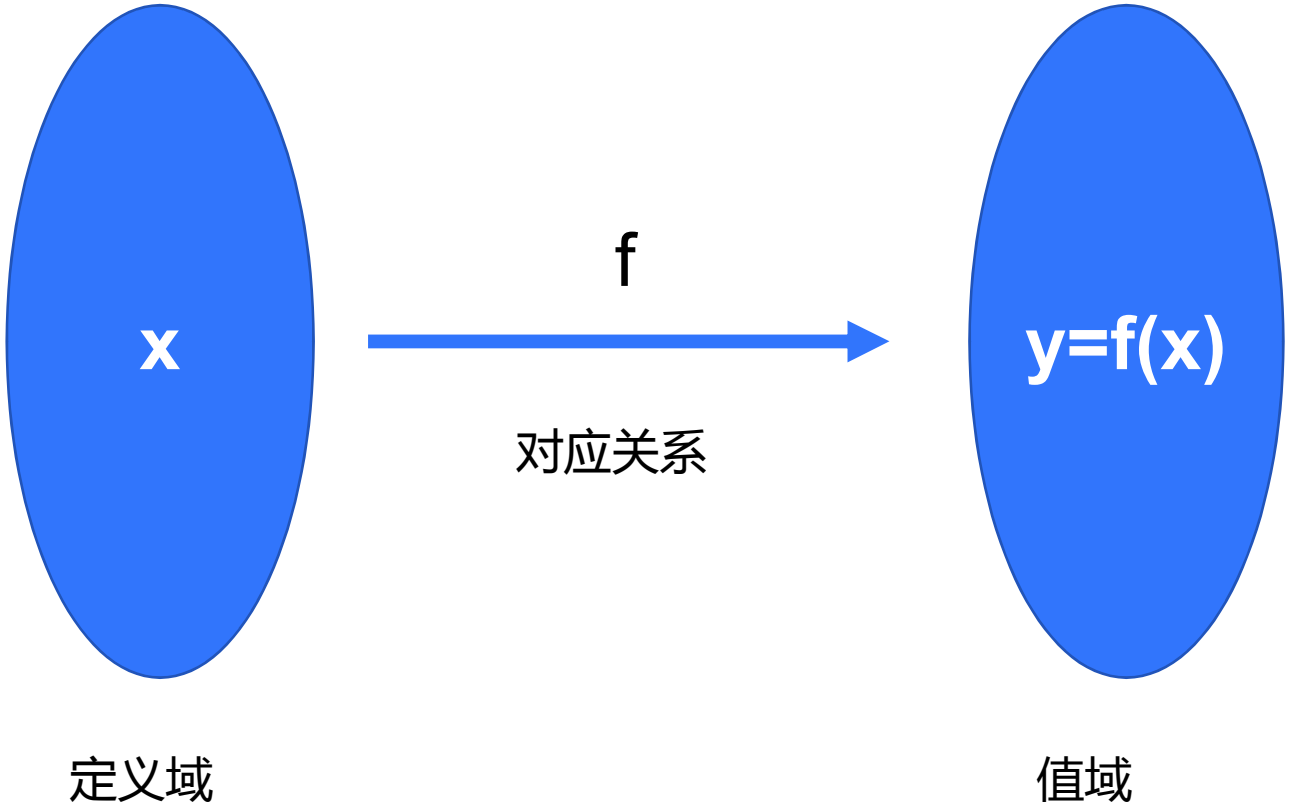
$$\because \lim_{\Delta x \to 0} \frac{f(x_0+\Delta x)-f(x_0)}{\Delta x} = f'(x_0)$$

$$\therefore \lim_{\Delta x \to 0} \frac{f(x_0-\Delta x)-f(x_0)}{-\Delta x} = f'(x_0)$$

$$\therefore \lim_{\Delta x \to 0} \frac{f(x_0-\Delta x)-f(x_0)}{\Delta x}$$

$$= -\lim_{\Delta x \to 0} \frac{f(x_0-\Delta x)-f(x_0)}{-\Delta x} = -f'(x_0)$$

函数的概念



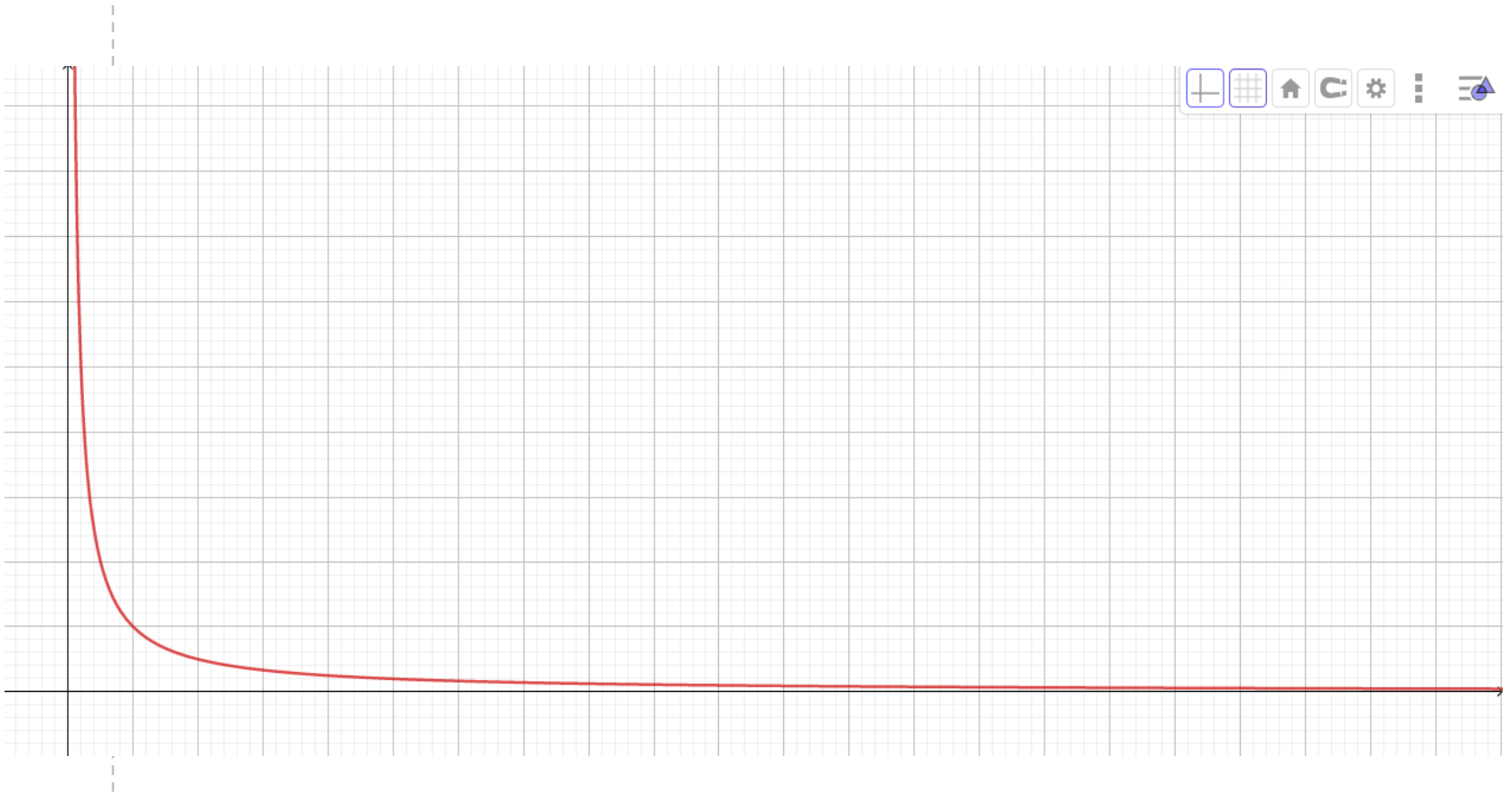
函数的概念

LOGO

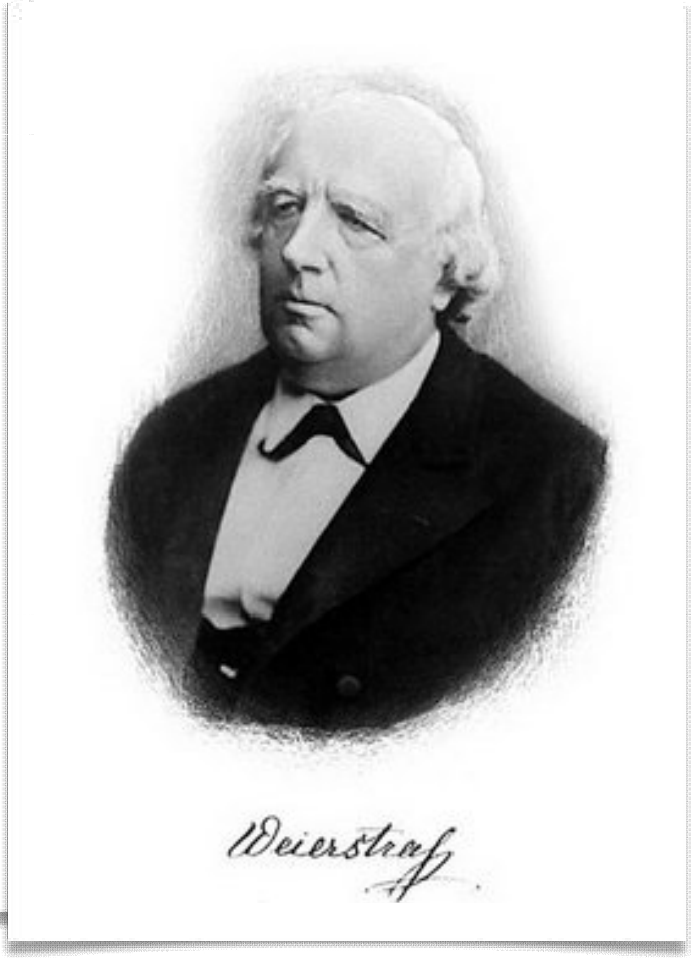
$$y=\frac{1}{x}$$

D=(1,∞)

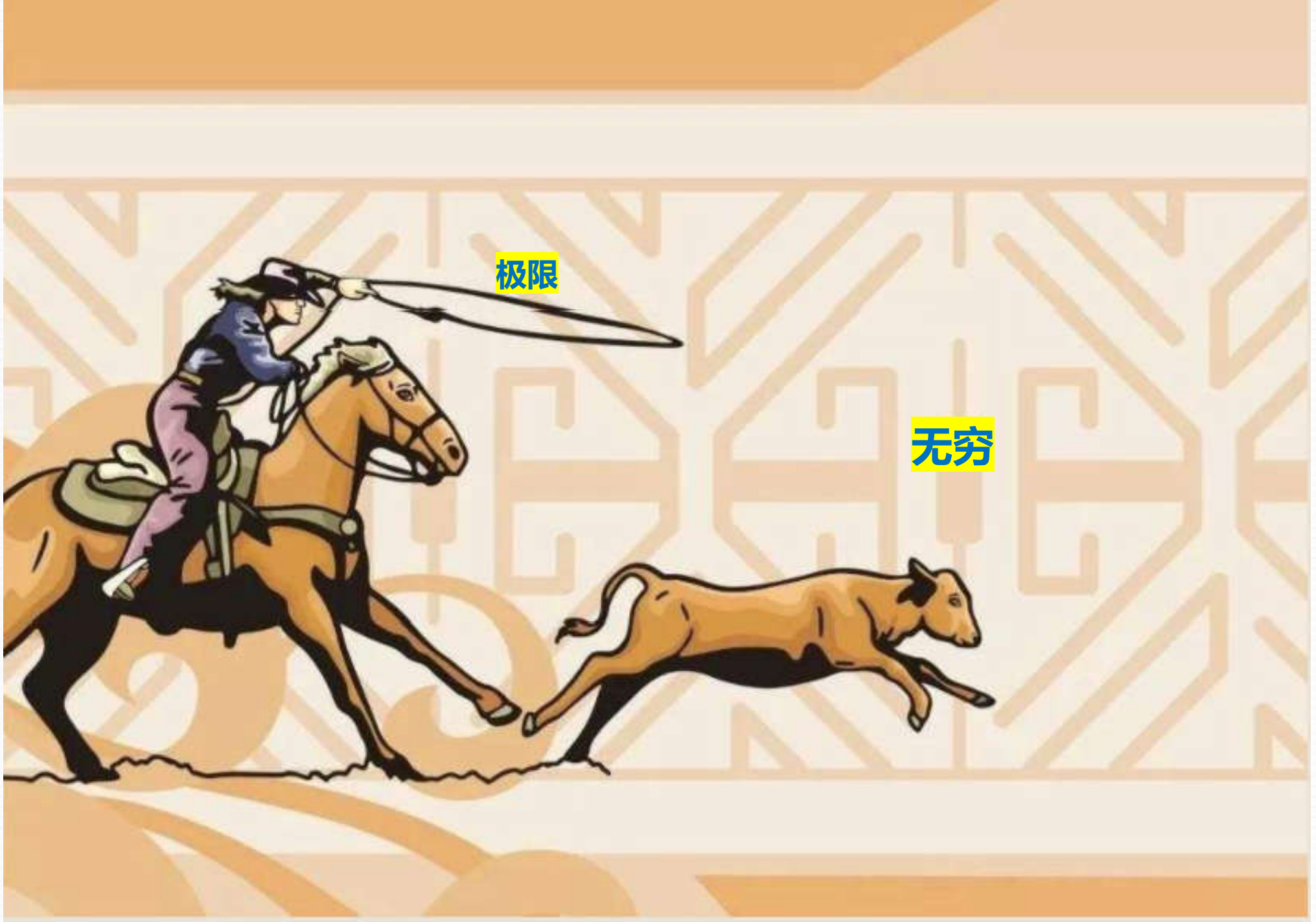
R=(0,1)



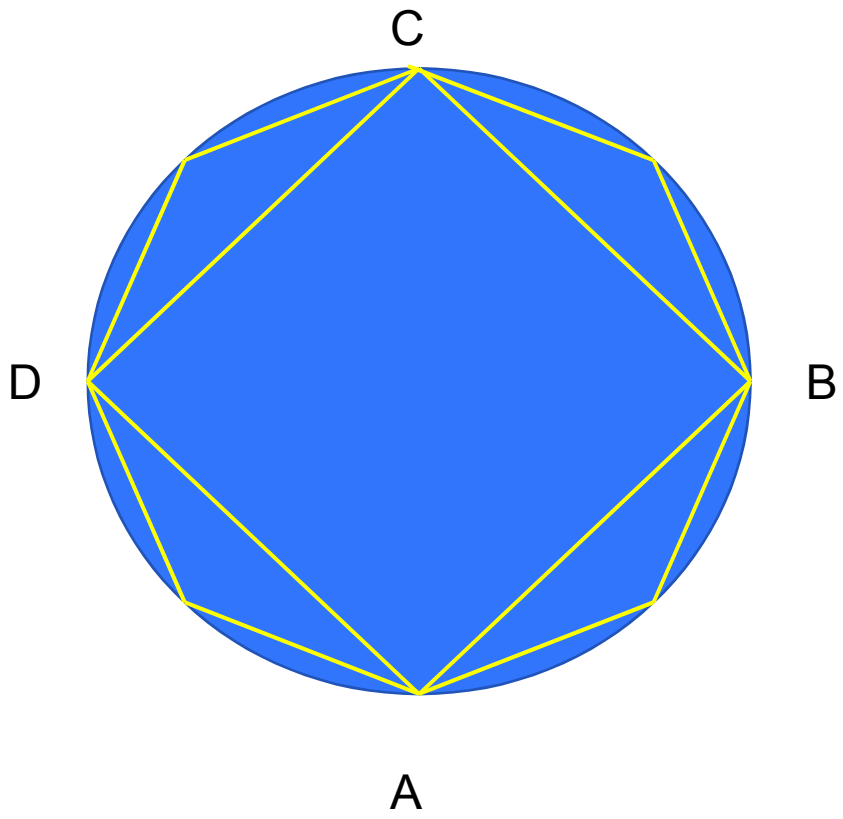
柯西与维尔斯特拉斯



ε-δ语言


极限
无穷

回到圆的面积



定义一个关于内接多边形n的面积的函数S(n)

圆的面积就是这个函数的极限