

# Wonder of Square

Shenghang Wang

# Units for Area

square meters ( $m^2$ ),

square centimeters ( $cm^2$ ),

square millimeters ( $mm^2$ ),

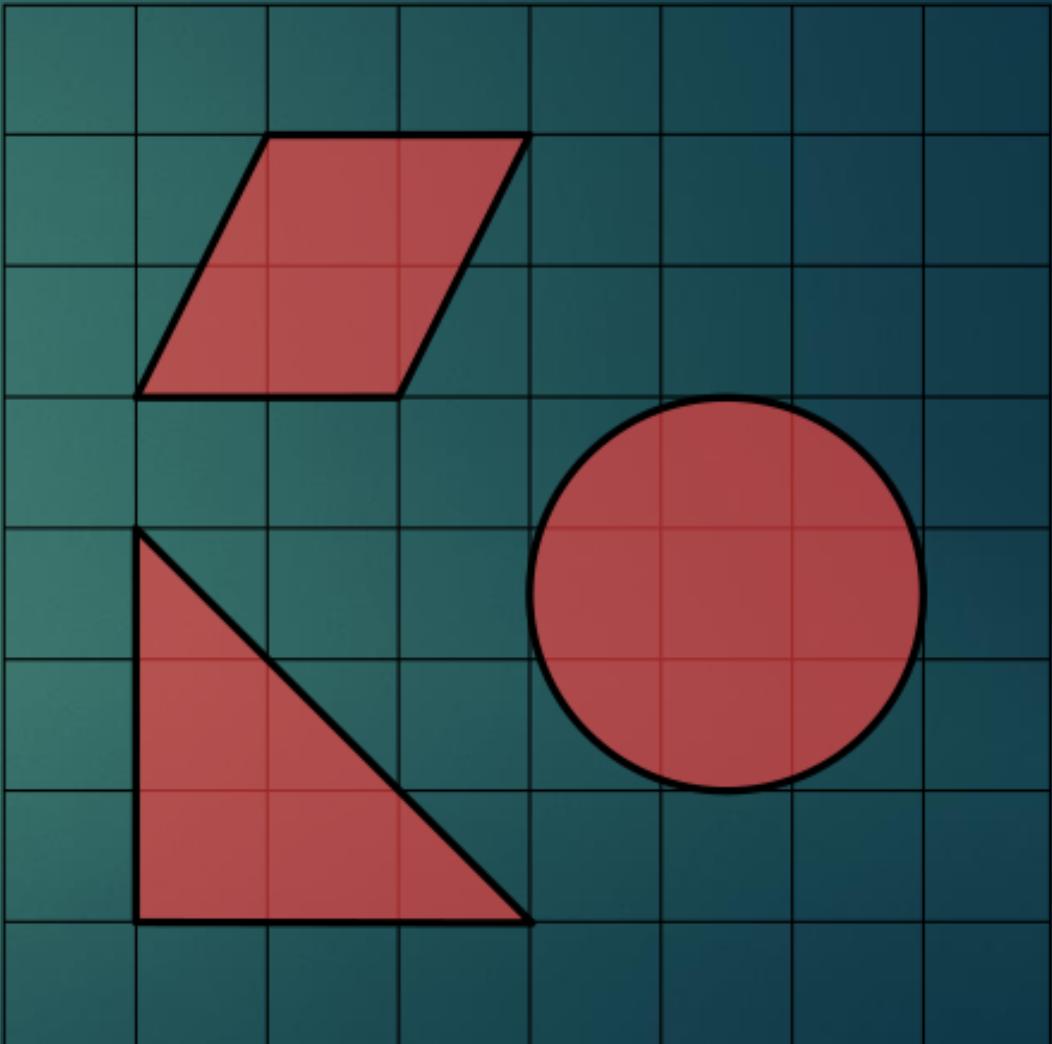
square kilometers ( $km^2$ ),

square feet ( $ft^2$ ),

square yards ( $yd^2$ ),

square miles ( $mi^2$ ), and so forth.

- ▶ Algebraically, these units can be thought of as the squares of the corresponding length units.

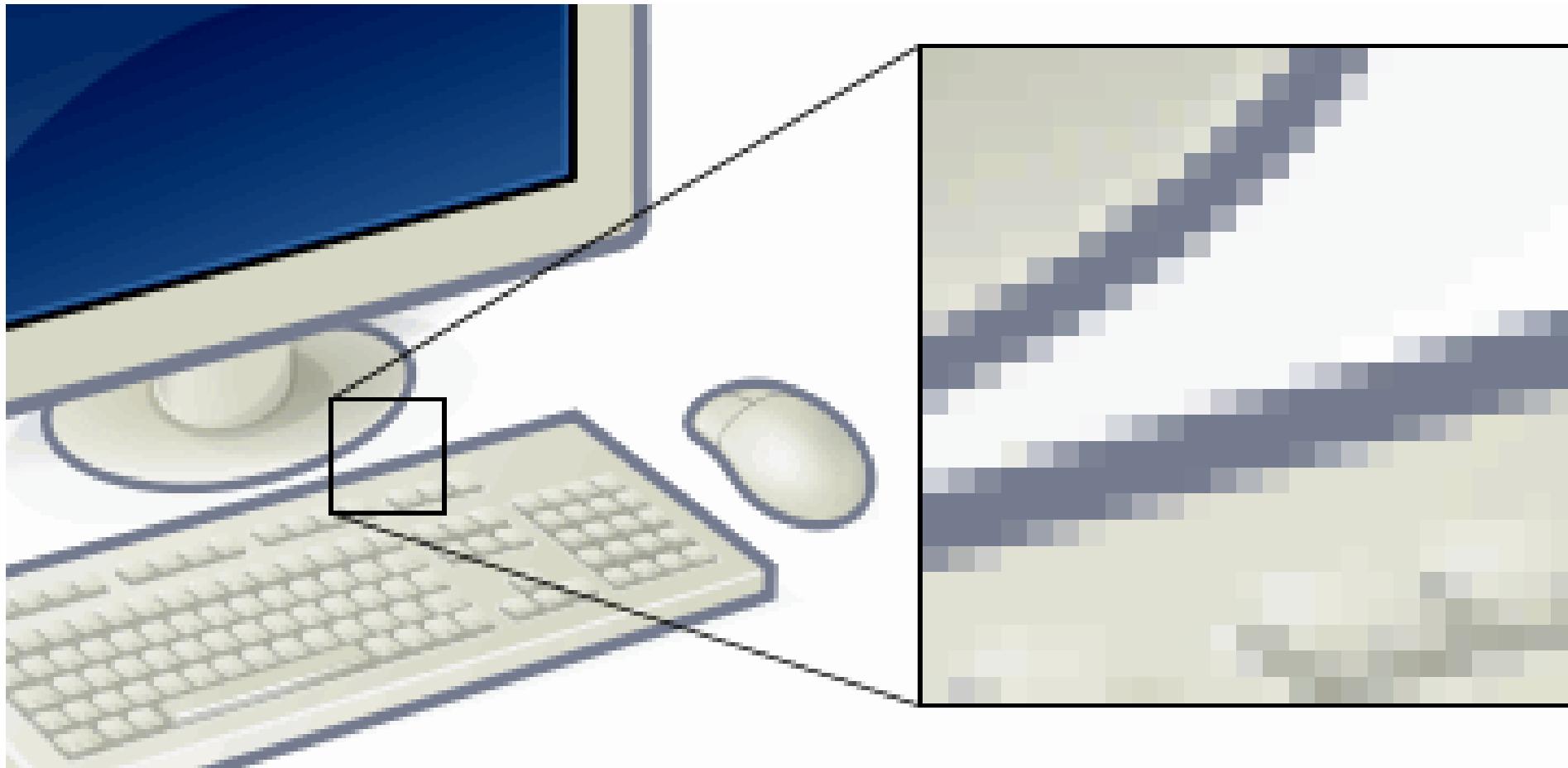




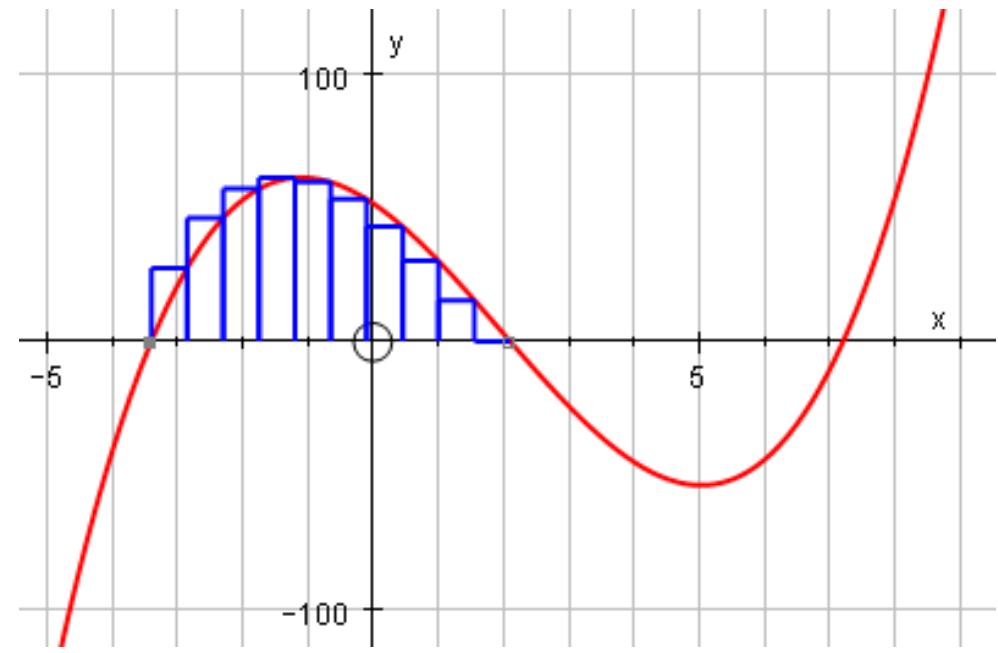
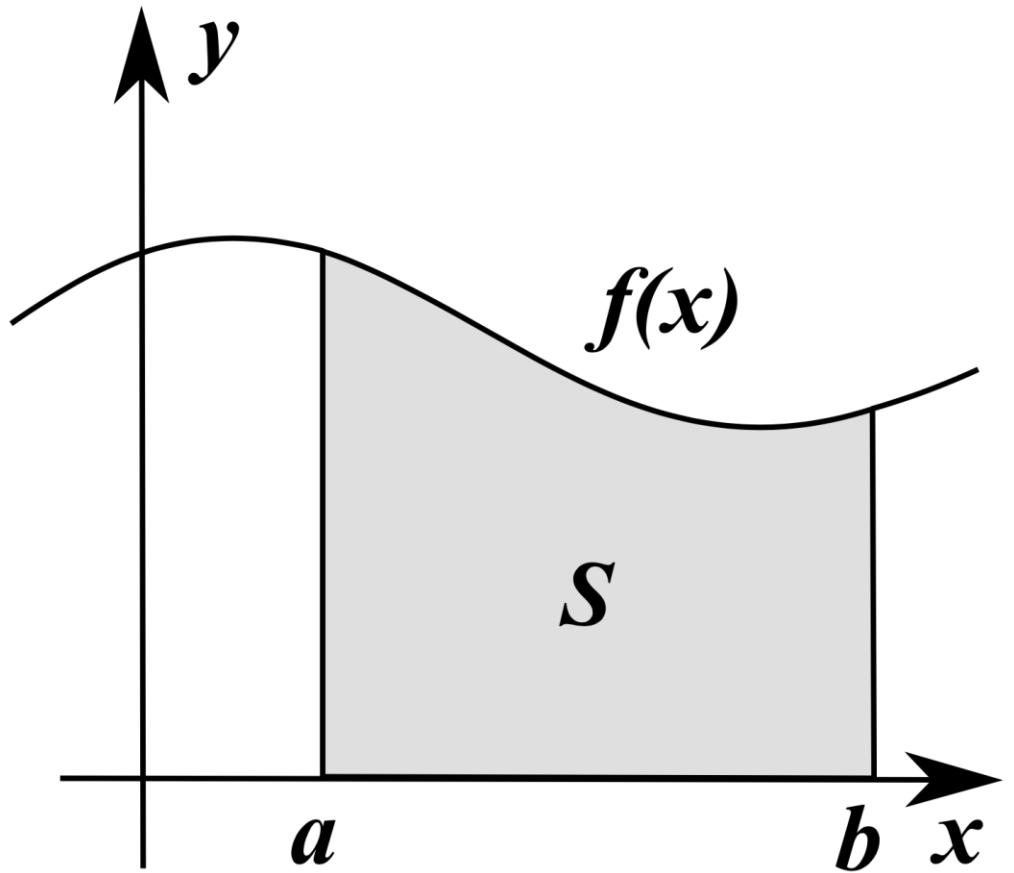




# Pixels

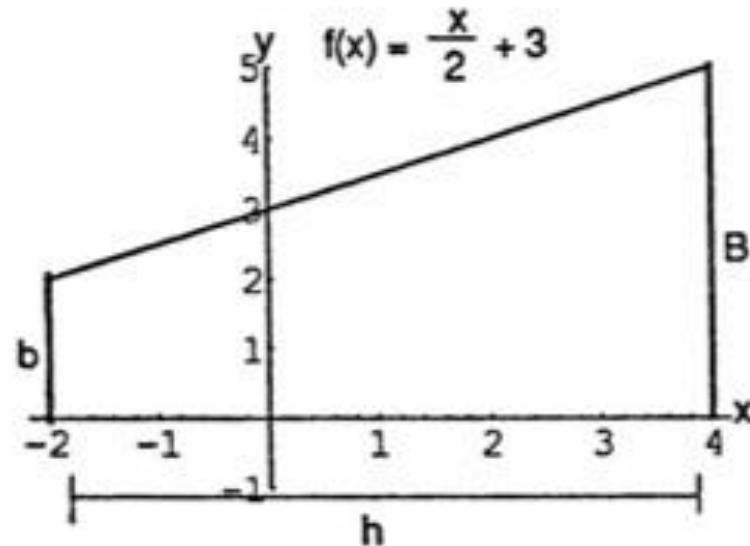


# Calculus

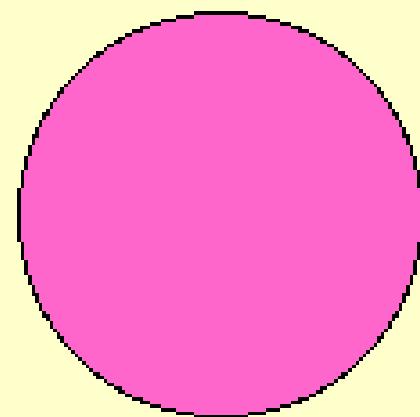


# The area of a Trapezoid

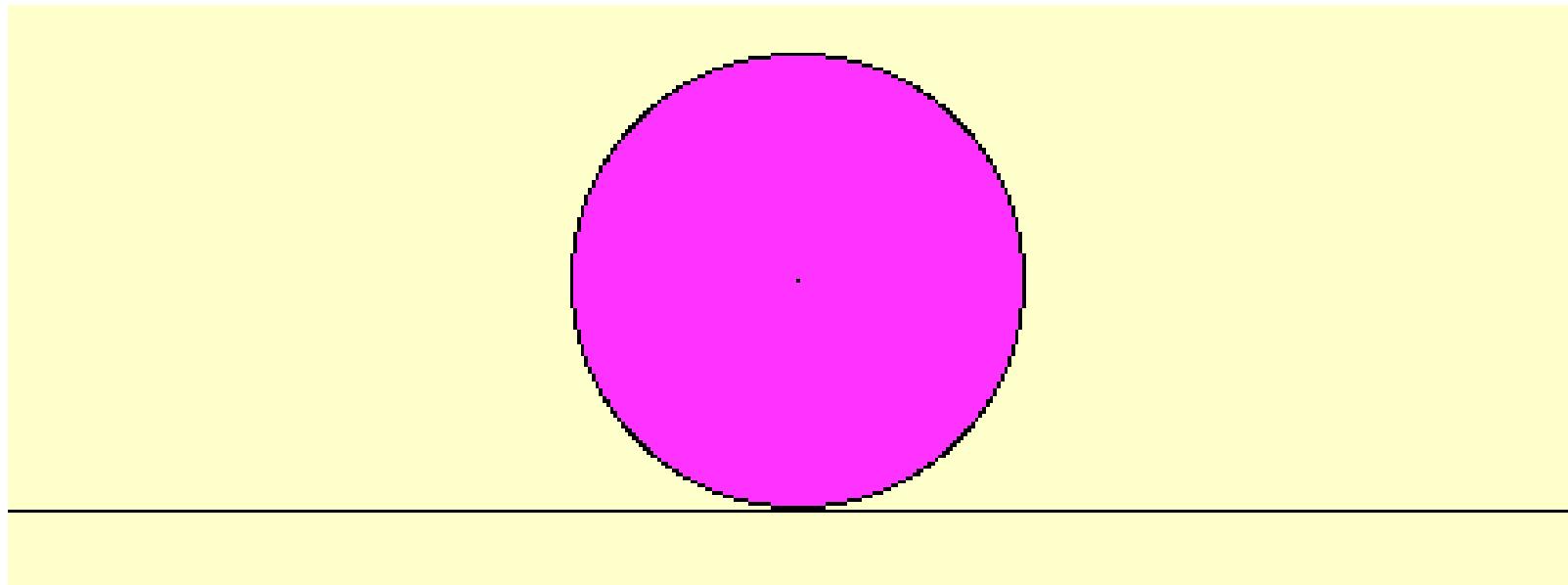
$$\begin{aligned}\text{The area of the trapezoid is } A &= \frac{1}{2}(B + b)h \\ &= \frac{1}{2}(5 + 2)(6) = 21 \Rightarrow \int_{-2}^4 \left(\frac{x}{2} + 3\right) dx \\ &= 21 \text{ square units}\end{aligned}$$



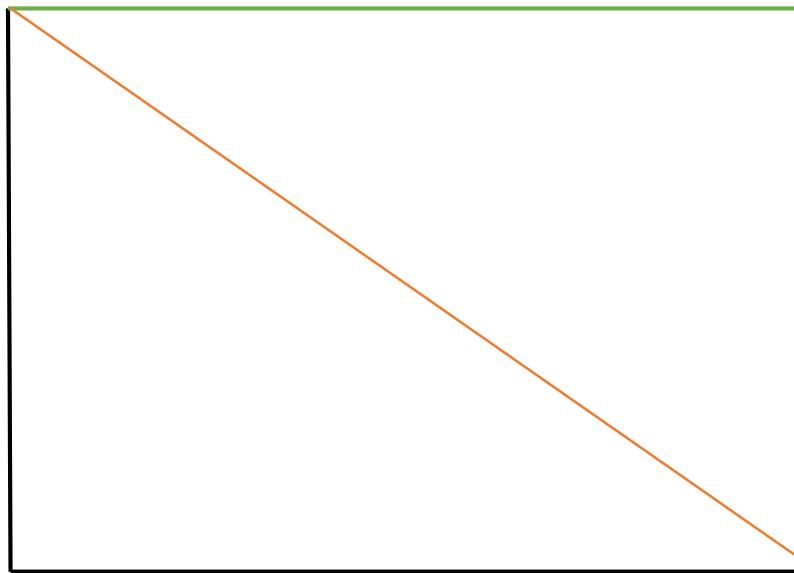
# The Area of a Circle



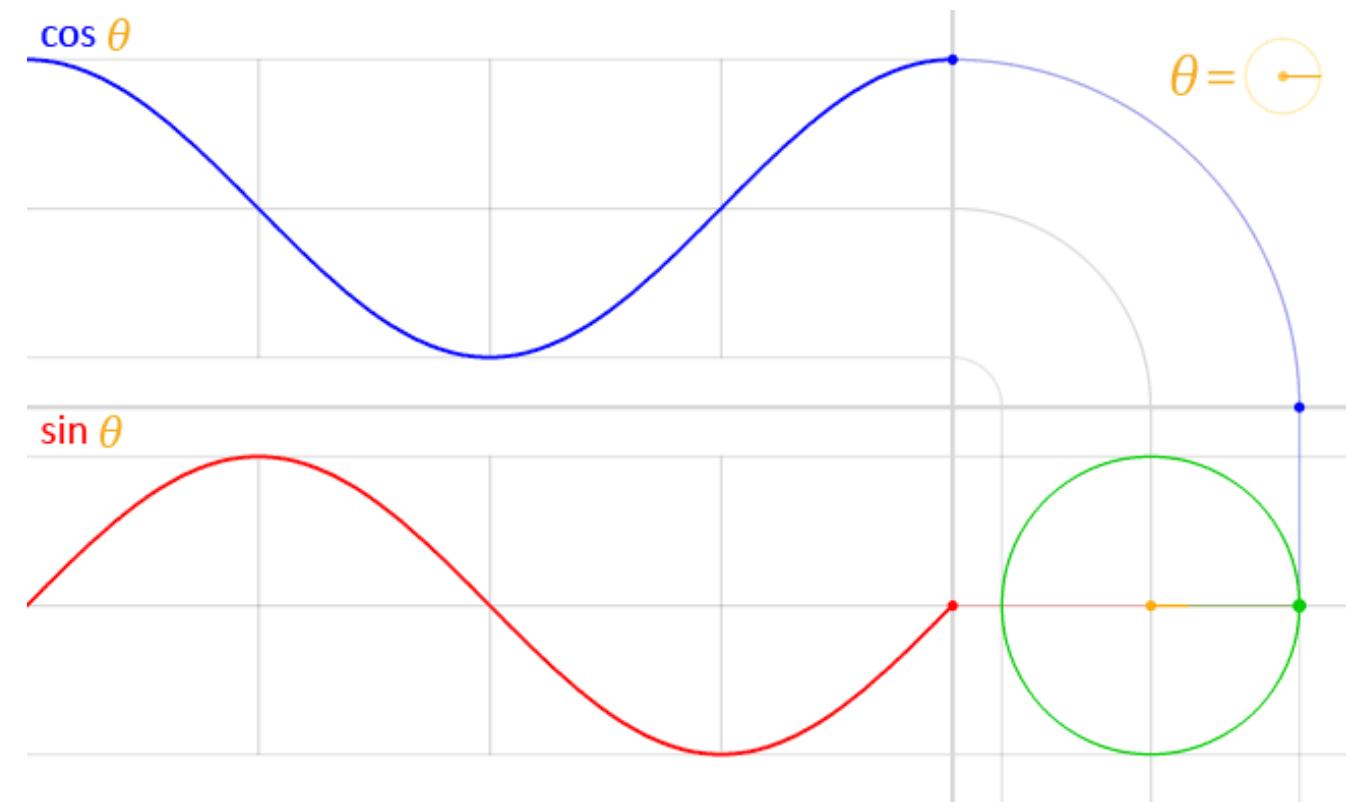
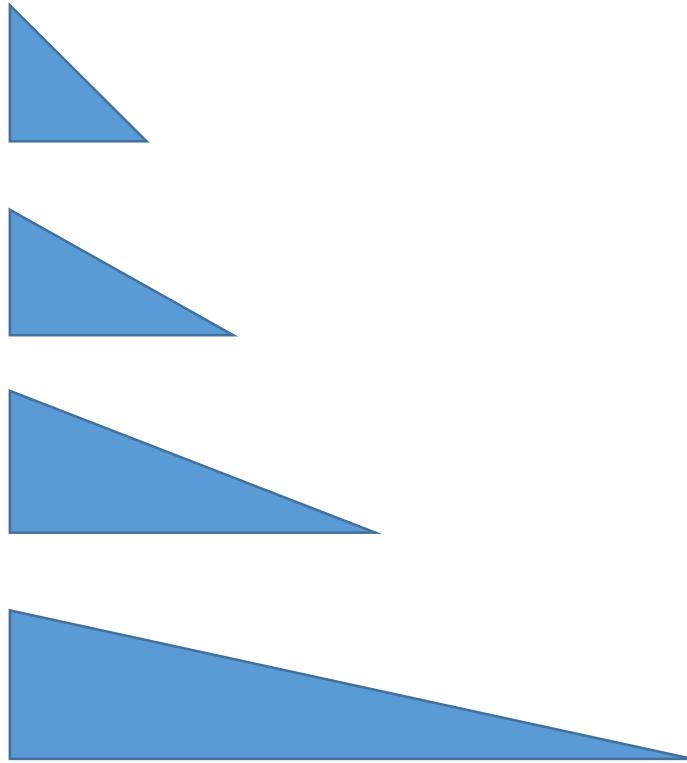
# The Area of a Circle II



# Rectangle

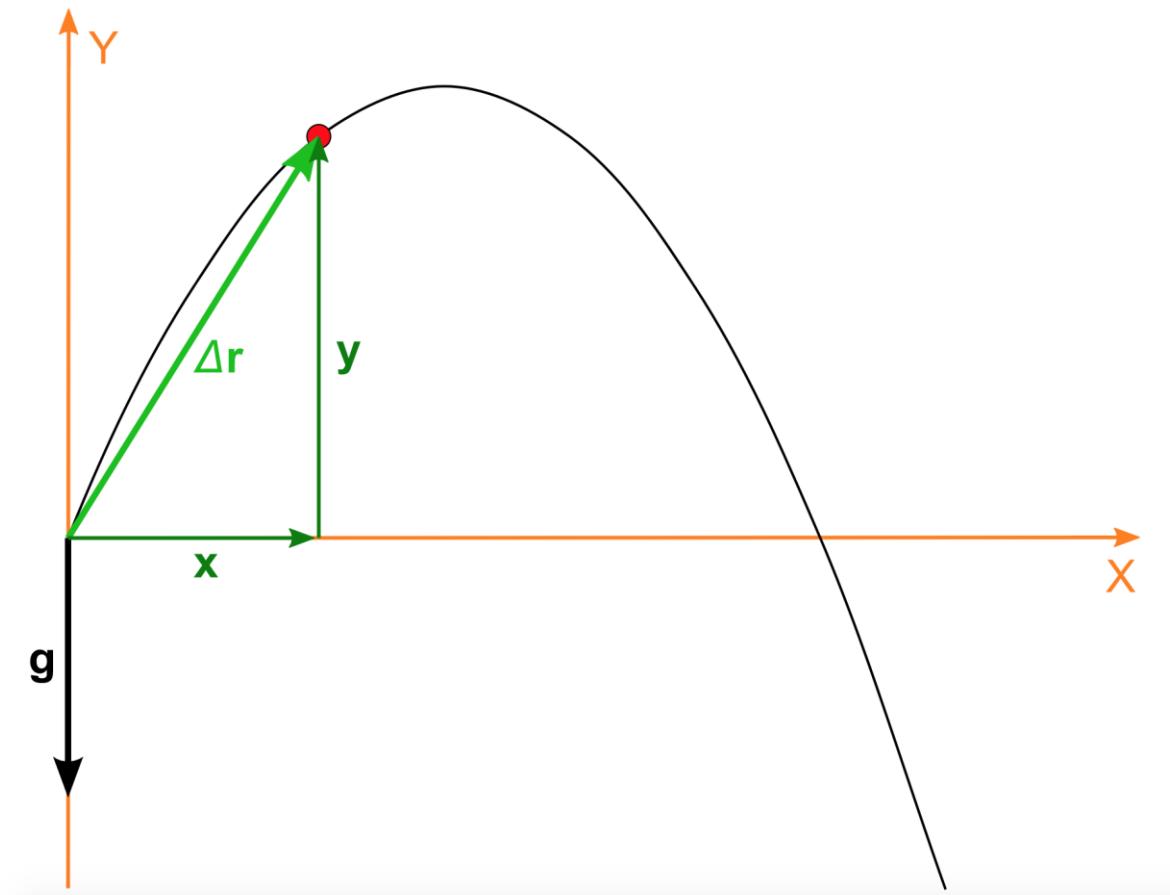


# Trigonometric Functions



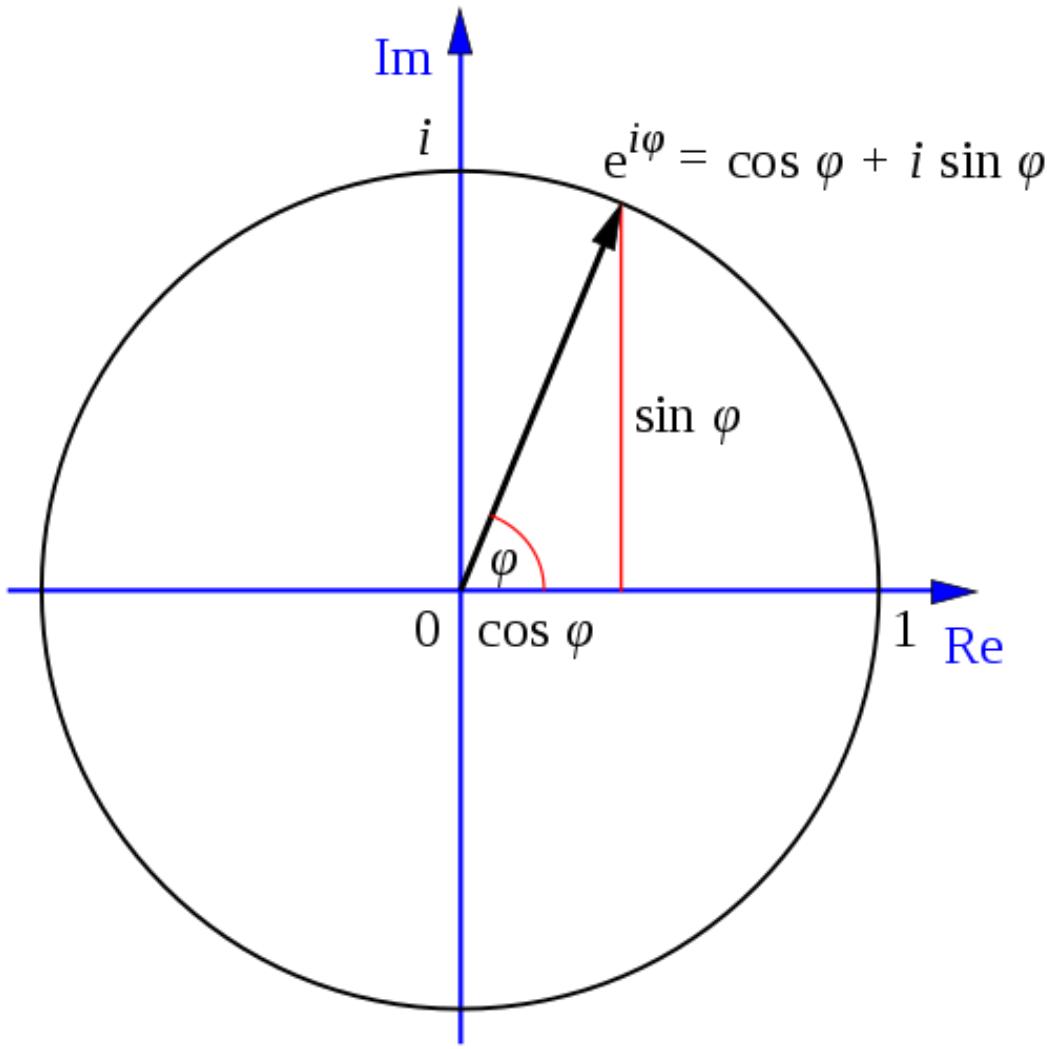


# Projectile motion



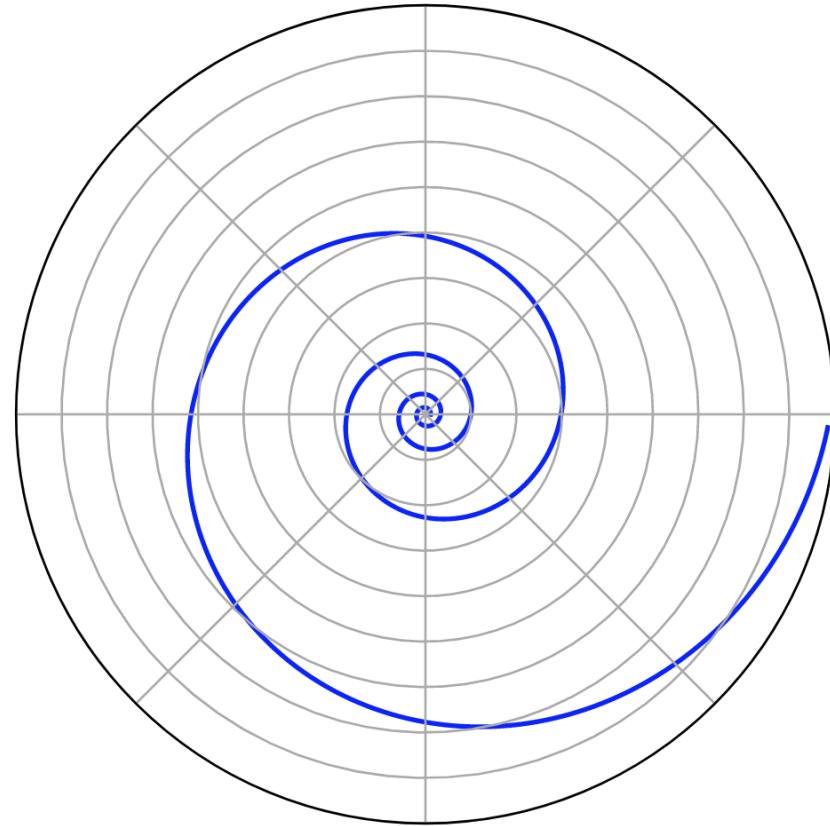
$$x = v_0 t \cos(\theta),$$
$$y = v_0 t \sin(\theta) - \frac{1}{2} g t^2.$$

# Euler's formula





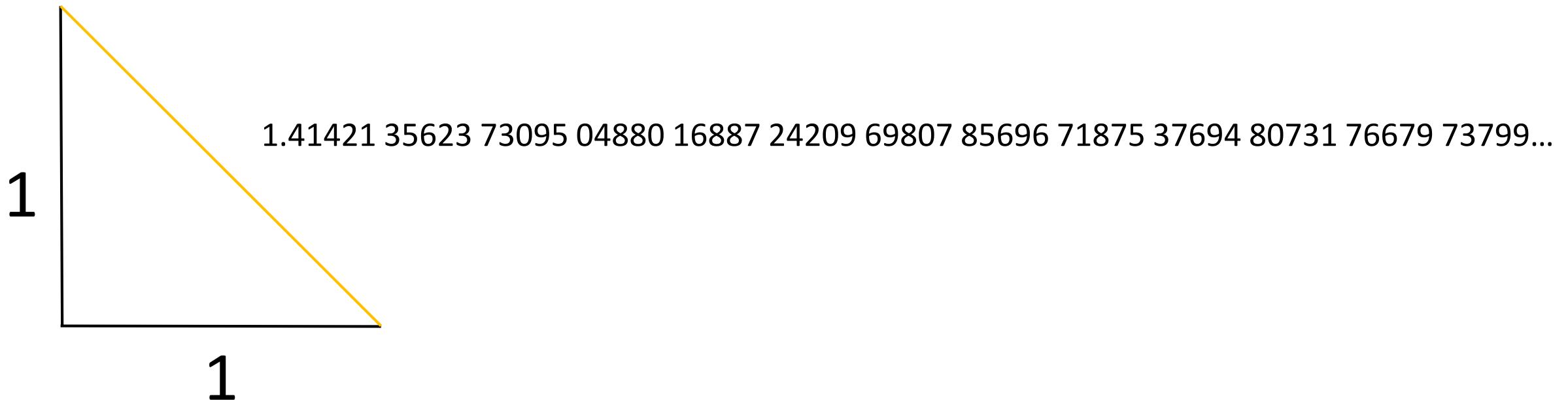
# Logarithmic Spiral



$$x(t) = r(t) \cos(t) = ae^{bt} \cos(t)$$
$$y(t) = r(t) \sin(t) = ae^{bt} \sin(t)$$

$$\sqrt{2} = 1.41421,35623,73095,04880,168  
87,24209,69807,85696,71875,376  
94,80731,76679,73799,07324,784  
62,10703,88503,87534,32764,15  
7 \dots$$

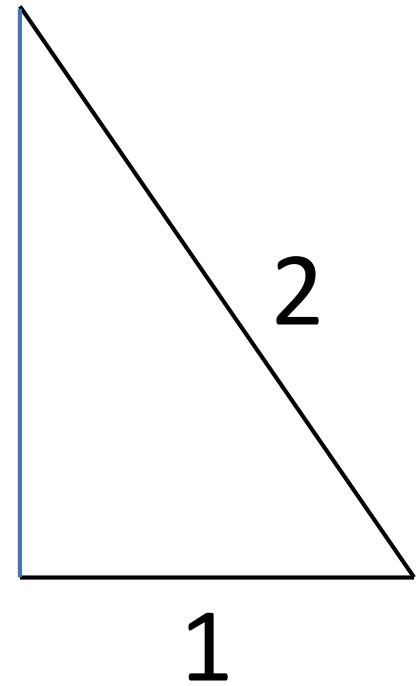
# Irrational Square Roots



$$\sqrt{2} = 1.41421 35623 73095 04880 16887 24209 69807 85696 71875 37694 80731 76679 73799\dots$$

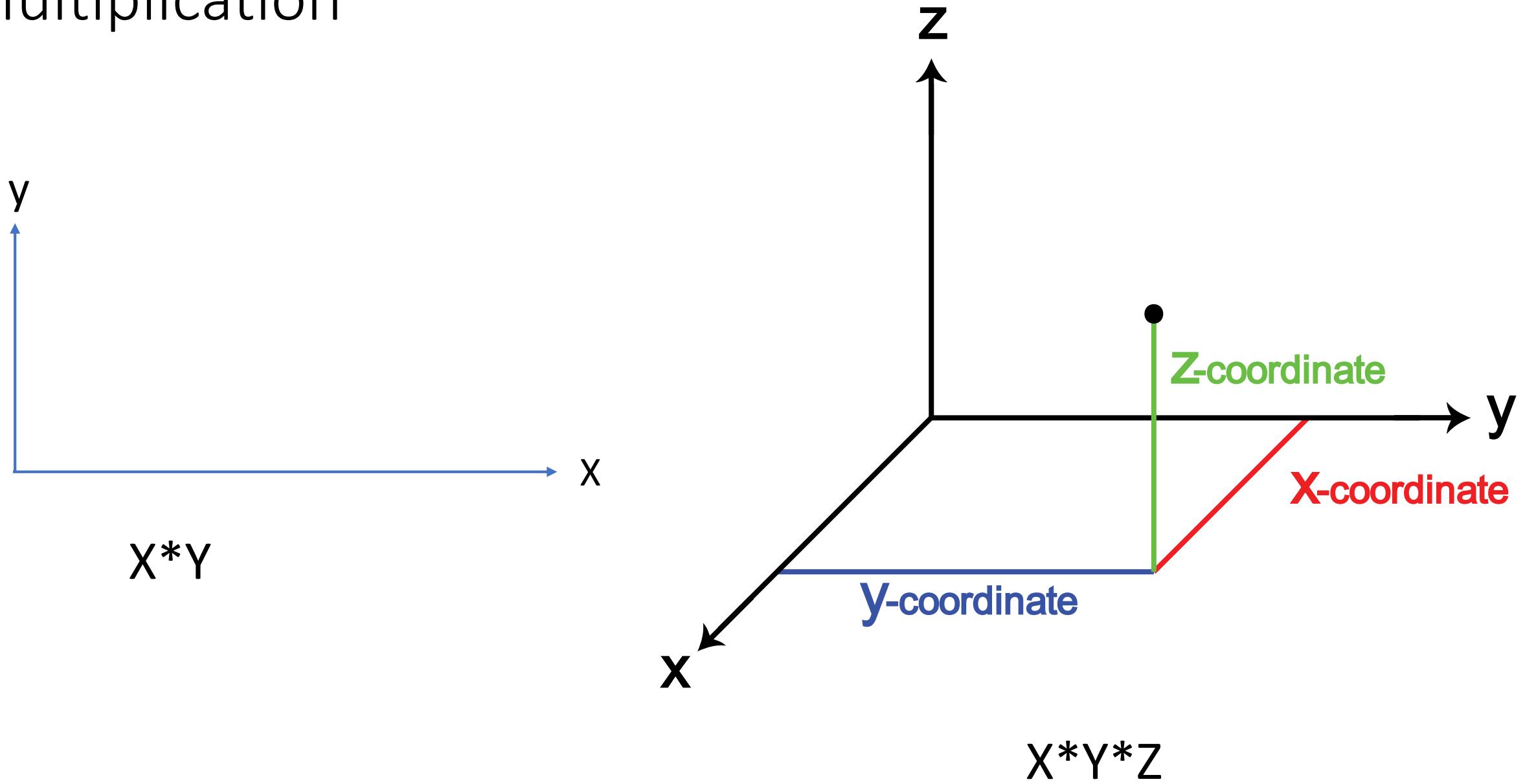
# Irrational Square Roots

1.73205080756887729352744634150587236694280525381038062805580...

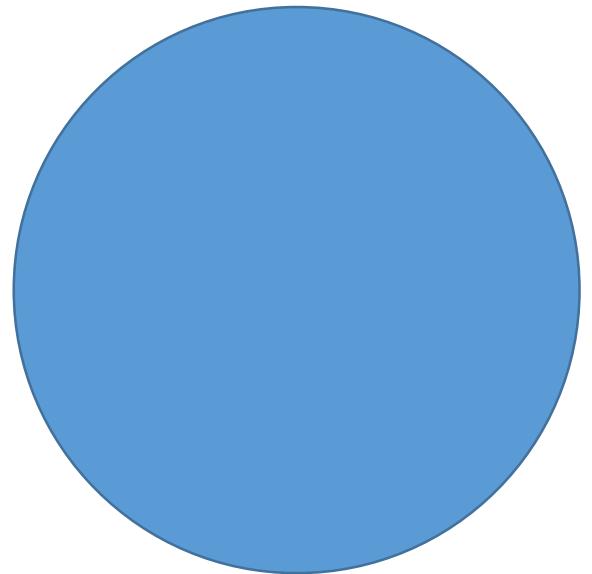


$$\sqrt{3} = 1.73205\ 08075\ 68877\ 29352\ 74463\ 41505\ 87236\ 69428\ 05253\ 81038\ 06280\ 5580\dots$$

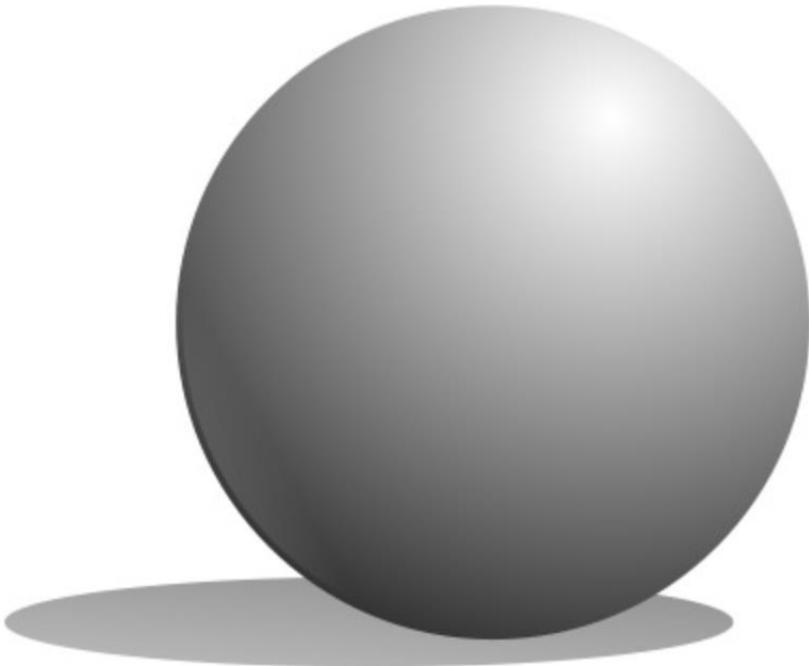
# Multiplication



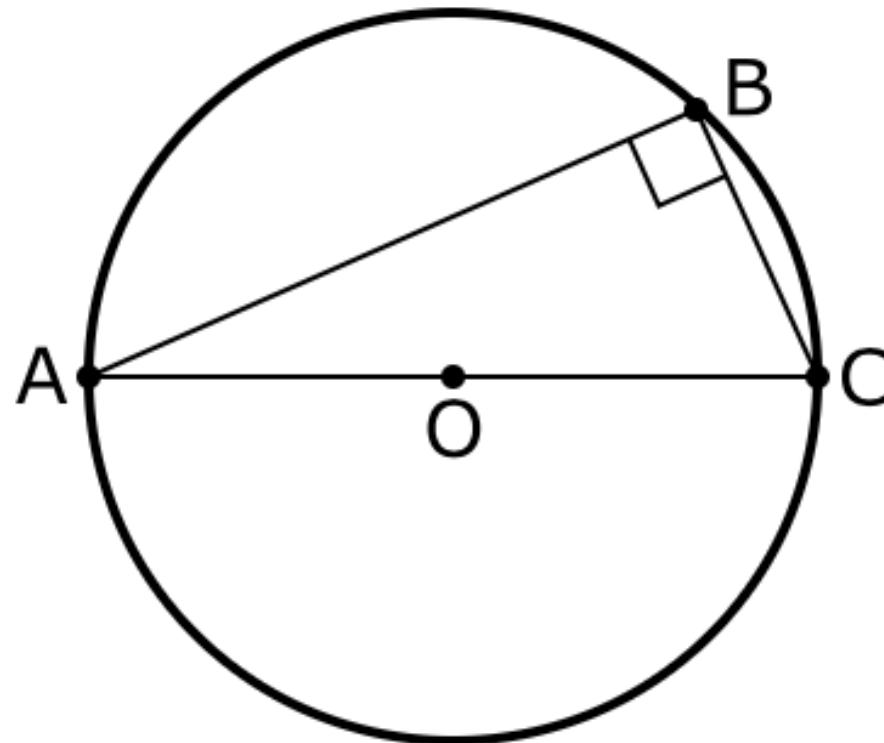
Circle



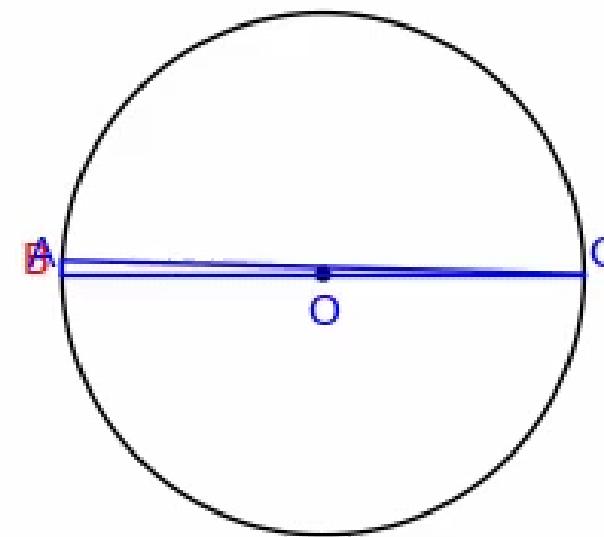
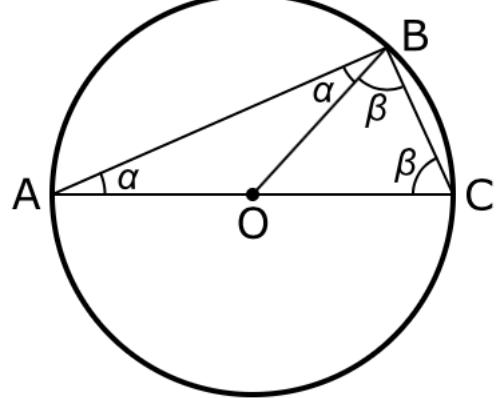
Sphere



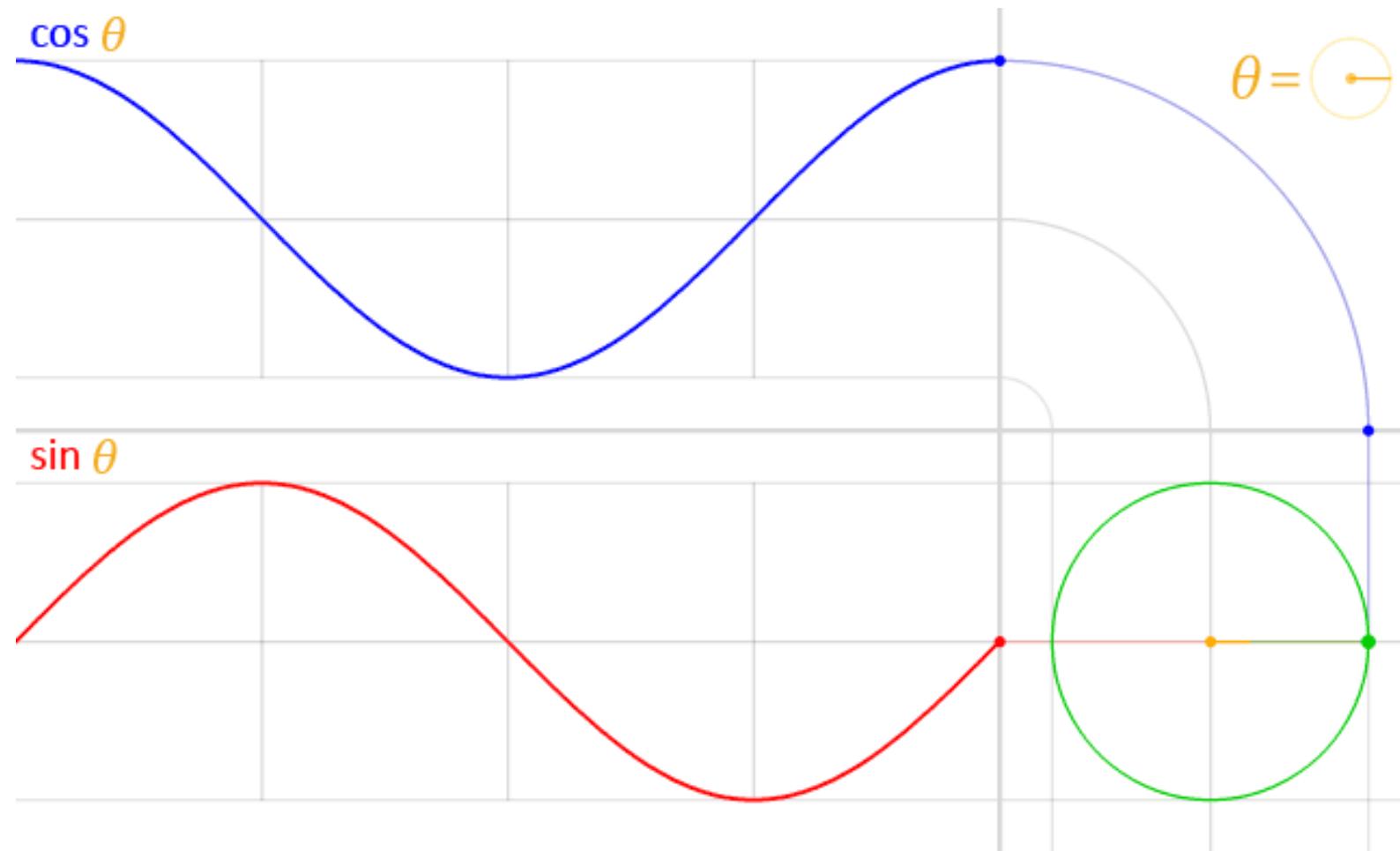
# Thales's theorem

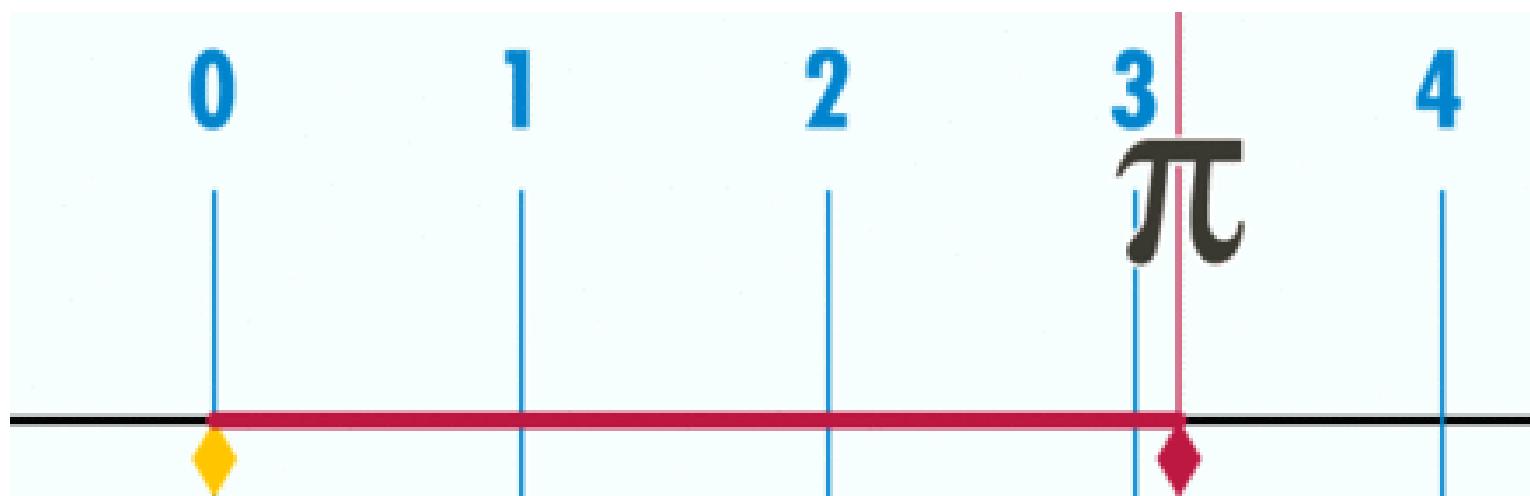


# Thales's theorem

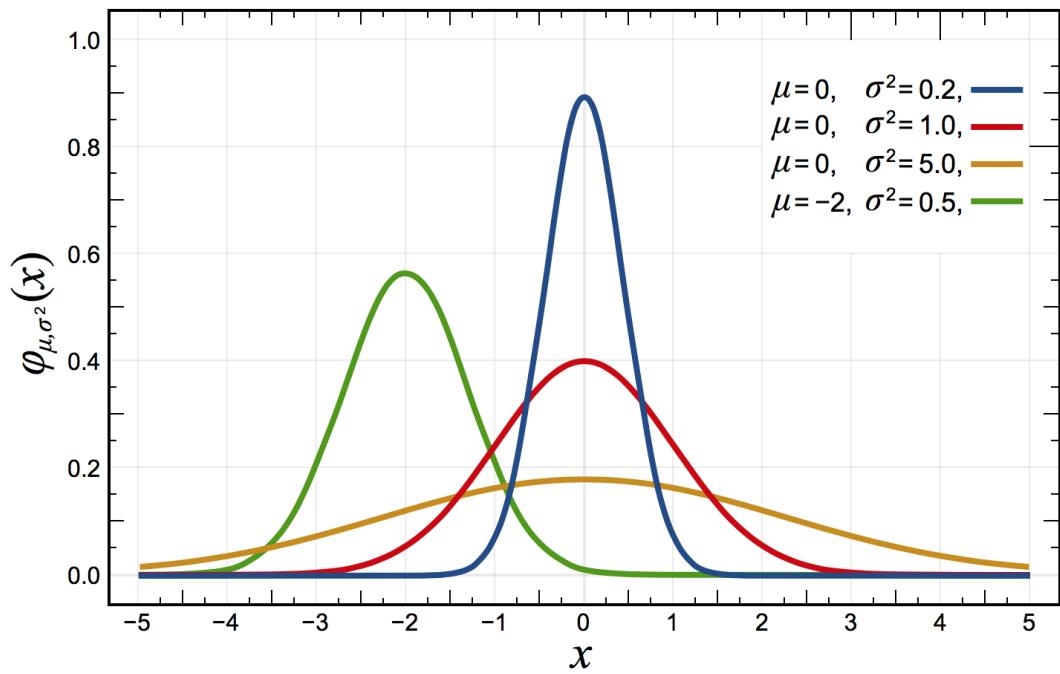


# Trigonometric Functions



$\pi$ 

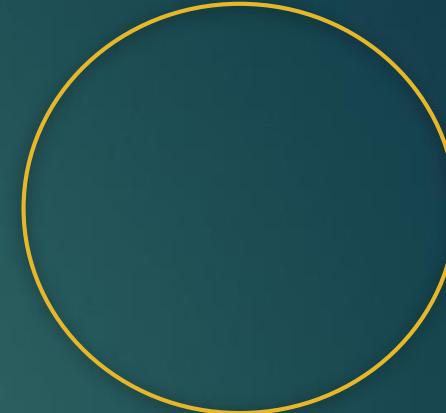
# Normal distribution



$$f(x | \mu, \sigma^2) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

0

1



Is it that, all the underlying mechanisms of nature can be traced to these fundamental interactions between counting and right angle which derives from circle?

Or it's them (or some of them) that set the limits on our Math?

*Thank You!*