A preview of Calculus :

Calculus was developed to solve primarily two type of problems.

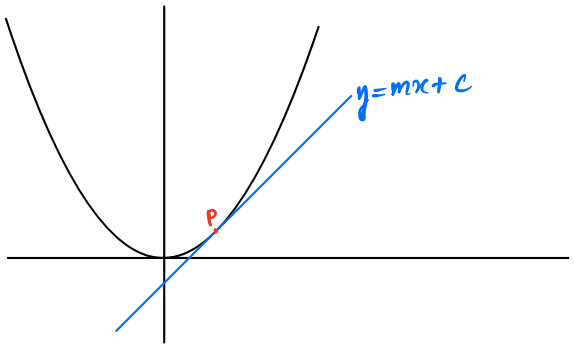
① The tangent problem

② The Area problem

"The Tangent Problem"

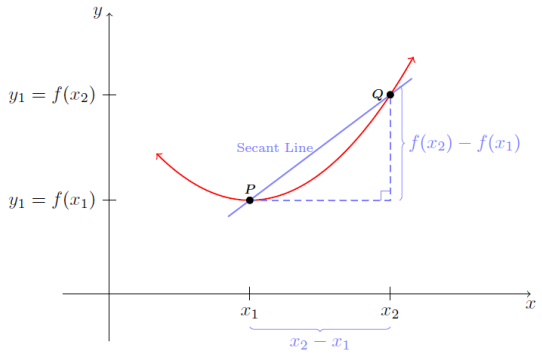
We have already seen for a straight line $y = mx+c$ passing through (x_1, y_1) & (x_2, y_2) we have

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$



Now the question is when you have any non-linear curve and one point (P) on the curve & we need to find the slope & equation of the tangent line pass through P.

Similar process



We want to find the slope & tangent line at P.

Step 1: We choose another point Q on the same curve.

Step 2: Draw a line through P & Q.

Step 3: Move Q towards P along the curve.

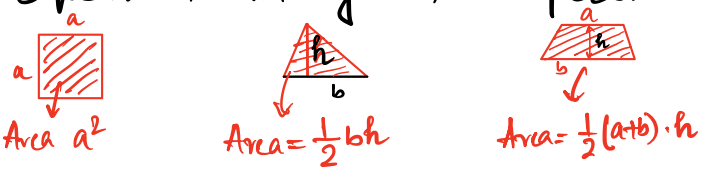
Try → https://i.sstatic.net/H9qsY.gif ← Try.

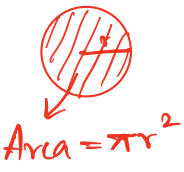
Step 4: Observe the slope & tangent line.

This will lead to the concept of LIMIT.

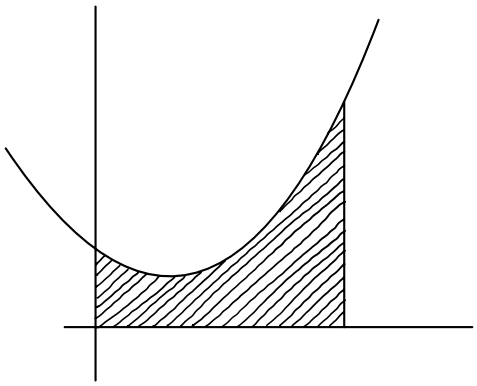
"The Area Problem"

We know the area formula for rectangle, circle, square, triangle, trapezoid, & so on.

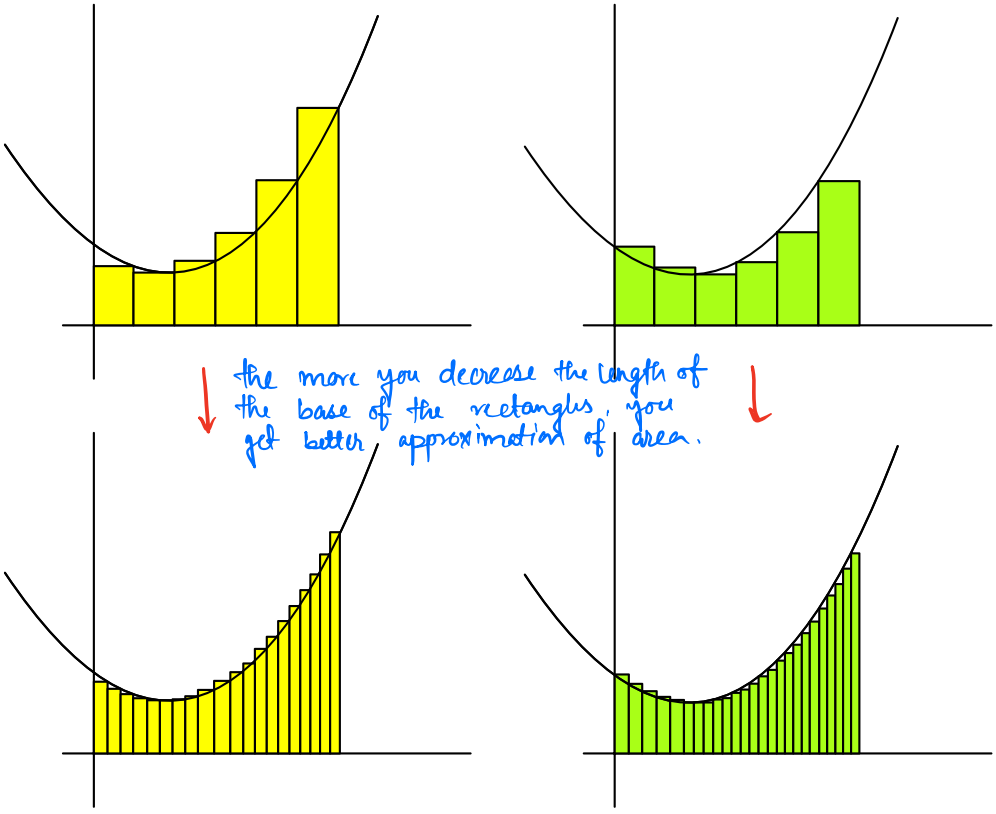




Now how to find this following area?



Intro to the idea:



Application of "Tangent Problem"

- Motion of a particle (velocity, acceleration)
- Optimization (to find maxima/minima)

Application of "Area Problem"

- Finding Area, Volume etc.
- Total Accumulation.