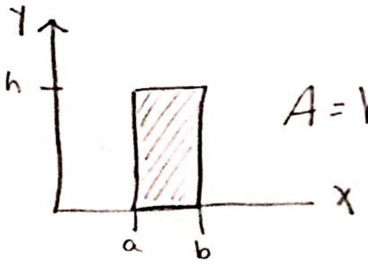
5.1 - Area

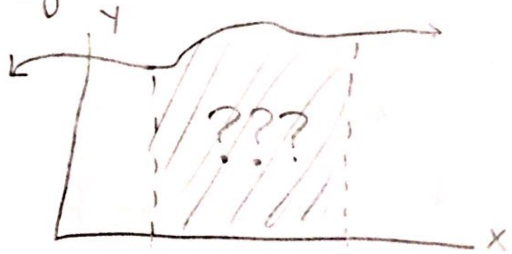
Area of a rectangle? →

$A = hw$

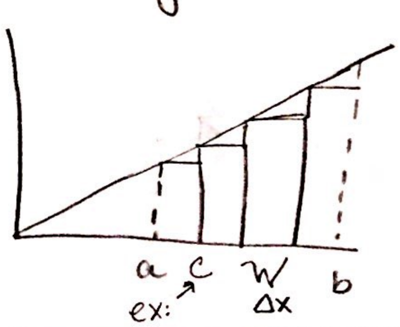


$A = h(b-a)$

Area of:



we can approximate the area under curves w/ rectangles!
(as long as the curve is continuous & non negative)



↳ lets make the rectangles we use all have an even base

$\Delta x = \frac{b-a}{n}$ ← # of ▯ you want

h will be the y value at a point
lets call h $f(c)$ ← some x value

↳ Once we find all the $f(c)$ and our Δx, we can calculate the area of all the ▯ and add them

Area $= A_1 + A_2 + A_3 + A_4 + \ldots$

$(f(c_1))(\Delta x) + (f(c_2))\Delta x + (f(c_3)\Delta x) + (f(c_4))\Delta x \ldots$

but we can write that as

$= \sum_{i=1}^{n} f(c_i)\Delta x$

- sum of
- n — ends at whatever # you want
- i=1 — starts at 1
- $f(c_i)$ — y value at whatever x we are on

But to get the perfectly correct area, we have to take ∞ rectangles

so lets call our summation

$S_n = \sum_{i=1}^{n} f(c_i)\Delta x$

and than

$$\text{Area} = \lim_{n\to\infty} S_n$$

To solve the limit problems follow these steps:

1. draw a picture
2. find Δx
3. find x_i ⟶ use $x_i = i(\Delta x)$
4. To find $f(c_i)$, plug in x_i everywhere you see an x in the given function
5. get the formula down to only contain n
   ↳ will be provided a formula
6. take the limit

– use examples on page 348 & 349 of book –