Math 1b (8:30 AM) 21 Jan 2020

Review Quiz

I want to re-index this from 0 to 9

$$\sum_{i=1}^{10} i^2 = \sum_{K=0}^{9} (K+1)^2 = \sum_{i=0}^{9} (i+1)^2$$

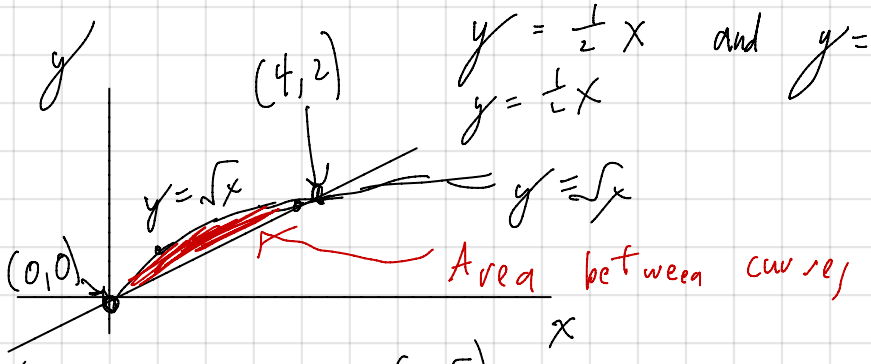
$K = i - 1$

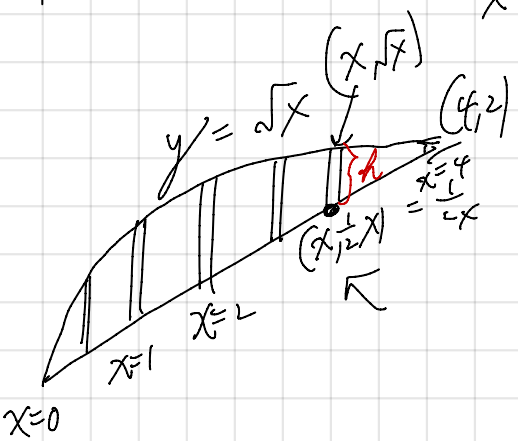
$K + 1 = i$

Section 6.1

Area between curves. (6.1 leads into 6.2, 6.3)

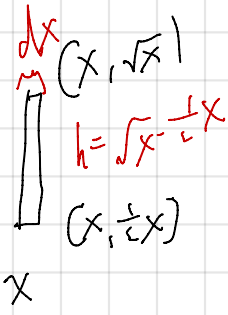
Example Problem What is the area between the curves $y = \frac{1}{2}x$ and $y = \sqrt{x}$



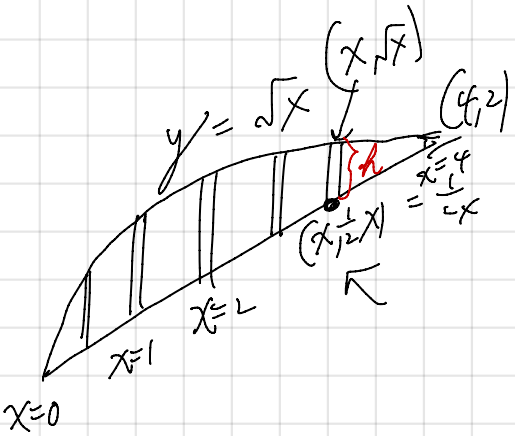


We divide the region into a "large" (maybe infinite) number of vertical rectangles that are very thin, and then we add up the area of the rectangles.

Let x be the horizontal position of each rectangle



$$\int_{x=0}^{x=4} \underbrace{(\sqrt{x} - \tfrac{1}{2}x)}_{\text{height}} \underbrace{dx}_{\text{thickness}}$$



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No + C ~~when doing this~~

$$\int_0^4 (x^{\frac{1}{2}}-\tfrac{1}{2}x)\,dx = \left[\tfrac{2}{3}x^{3/2}-\tfrac{1}{4}x^2\right]_0^4 = \tfrac{2}{3}\cdot 8-\tfrac{1}{4}16$$

$$= \tfrac{16}{3}-4 = \tfrac{16}{3}-\tfrac{12}{3} = \boxed{\tfrac{4}{3}}$$

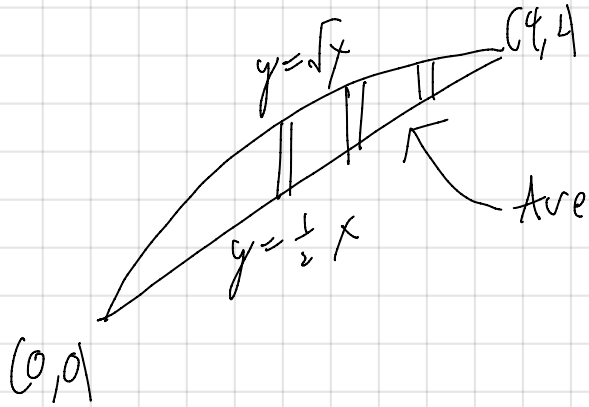
FTC $\quad \int_a^b f(x)\,dx = F(b)-F(a)$

where $F(x)$ is any particular anti-derivative of $f(x)$

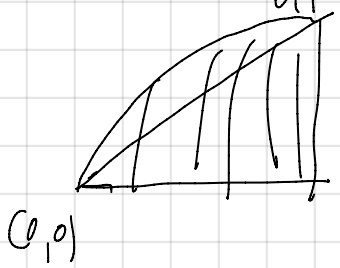
$$F'(x)=f(x)$$

$$\int_0^4 (x^{\frac{1}{2}}-\tfrac{1}{2}x\,dx = \left[\underbrace{\tfrac{2}{3}x^{3/2}-\tfrac{1}{4}x^2}+17\right]_0^4$$

$$= \left(\tfrac{4}{3}+17\right)-(0+17) = \boxed{\tfrac{4}{3}}$$



$$\text{Area} = \int \left(\sqrt{x} - \tfrac{1}{2}x\right) dx$$



Area under $\sqrt{y}$

$$\int_0^4 \sqrt{x}\, dy -$$

$$\int_0^4 \tfrac{1}{2}x\, dy$$

$=$