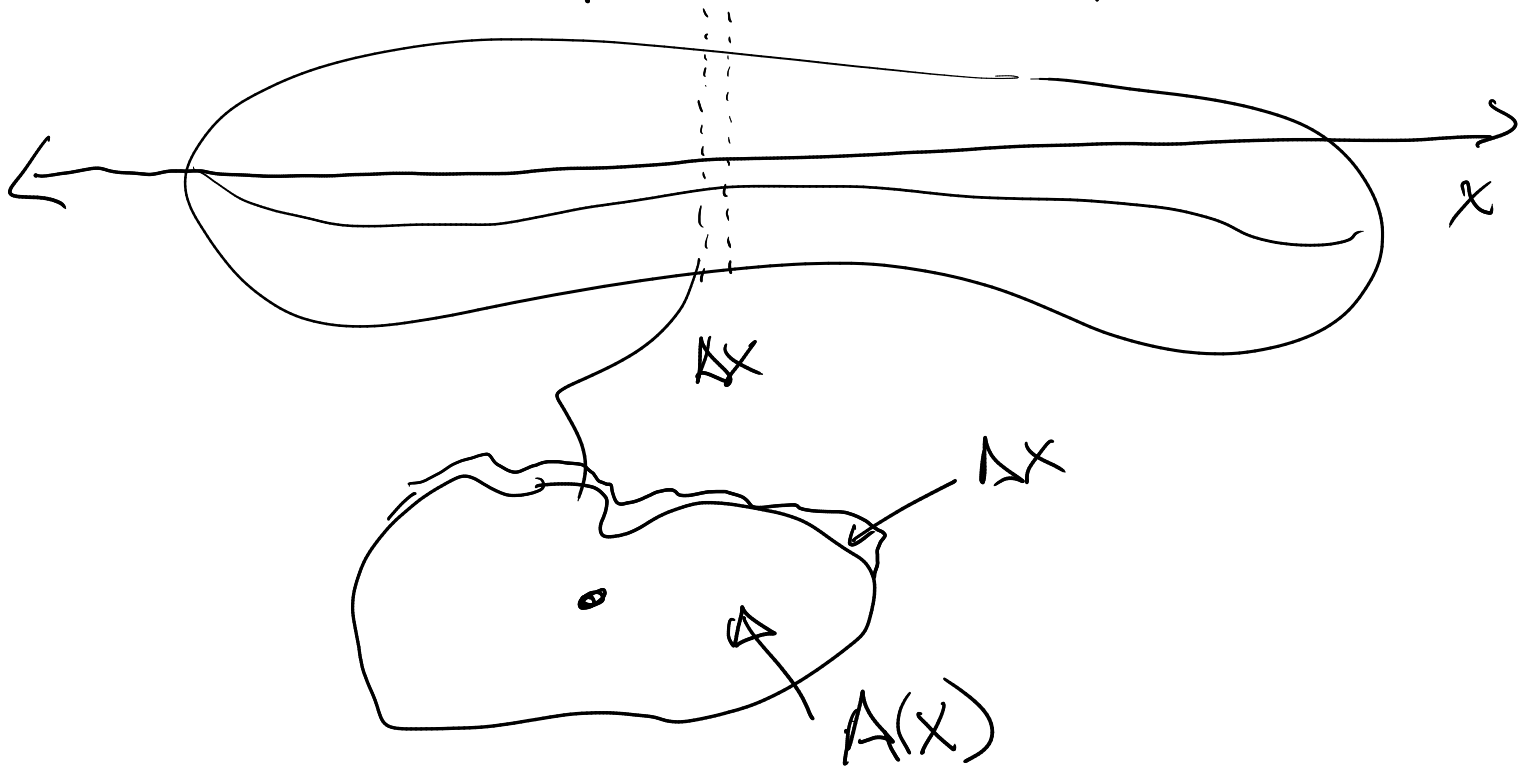
Math 181 Monday, February 1 Section 6.2

theme: Add up lots of little pieces



cross-sectional area

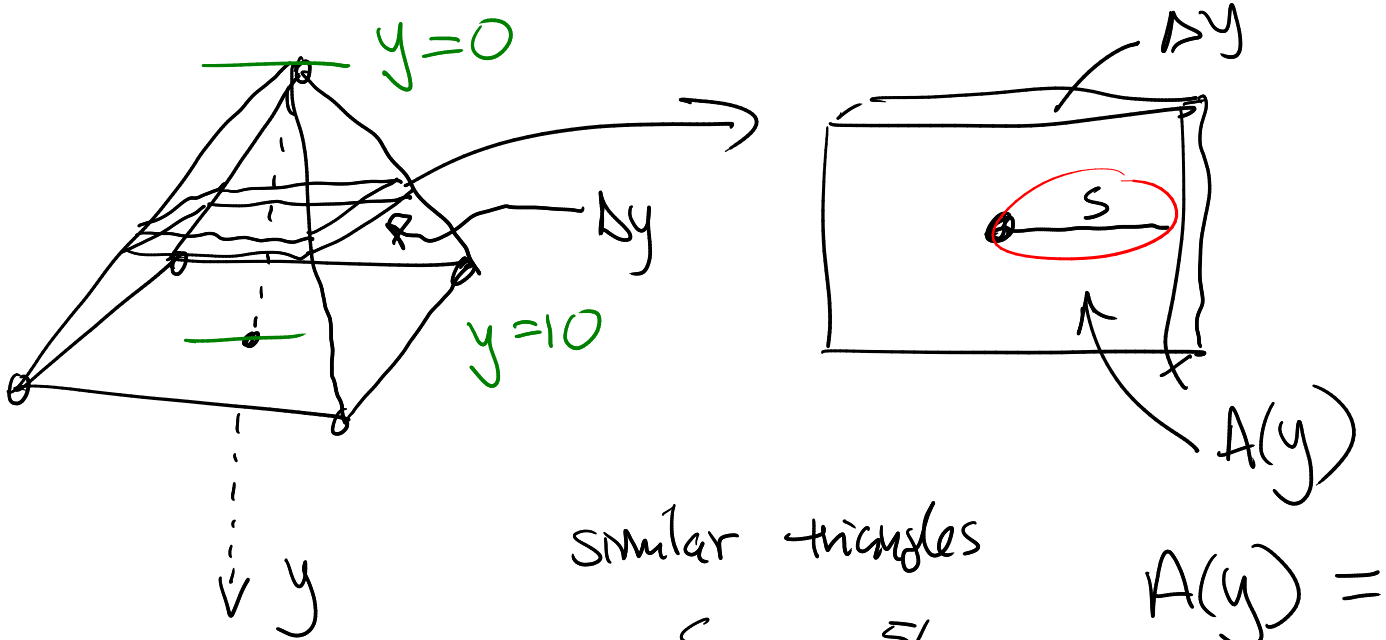
Tues 6PM 6.3

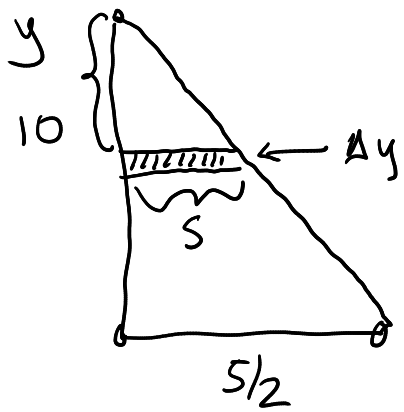
Thu 6.3/6.4

Fri 6.4

BYOB Bench Scene

Ex Volume of pyramid w/ height 10 & square base size 5.





similar triangles

$$\frac{s}{y} = \frac{5/2}{10}$$

$$s = \frac{1}{4}y$$

side length of square cross-section

$$A(y) = (2s)^2 = \left(2\left(\tfrac{1}{4}y\right)\right)^2$$

$$= y^2/4$$

Volume $= \int_{y=0}^{y=10} \underbrace{\frac{y^2}{4}}_{A(y)} \underbrace{dy}_{dV}$

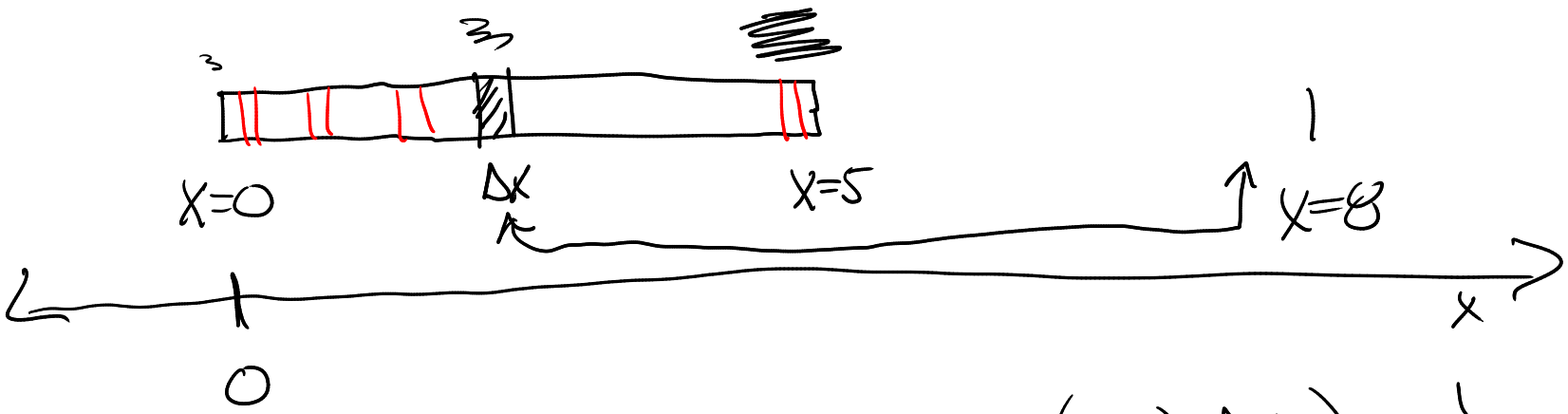
one
two
three

$$V = \int dV = \int A(y)\,dy$$

Ex A rod has charge density $q(x) = x^3$ charge/length $0 \le x \le 5$.

Electric field at $x = 8$

Electric field inversely proportional to square of distance



ΔE due to Δx

$$\Delta E = \left(q(x)\,\Delta x \right) \frac{1}{(8-x)^2}$$

$q(x)\,\Delta x$: amount of charge

charge/length · length

$$E = \int dE$$

$$= \int_{x=5}^{} q(x)\,dx \, \frac{1}{(8-x)^2}$$

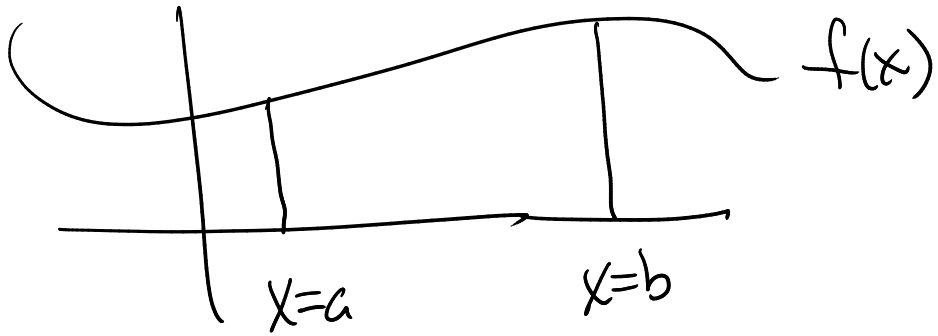
$$= \int_{x=0}^{} \frac{x^3\,dx}{(8-x)^2}$$

$u = 8 - x$

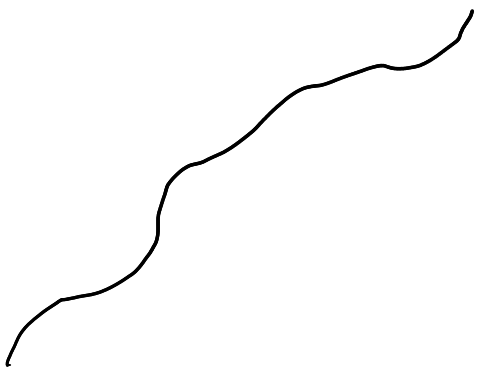
$x = 8 - u$

Average value: Average of 3, 7, 12 $\quad \frac{3+7+12}{3} = 22/3$

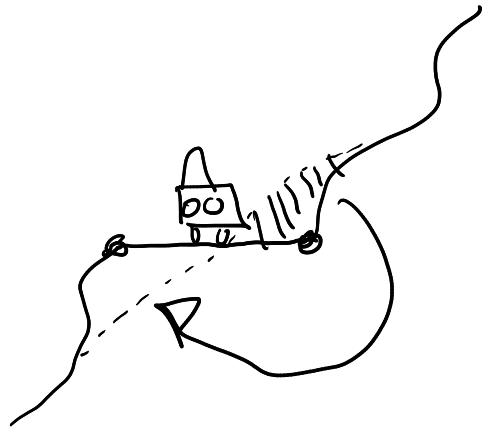
Average value of $f(x)$ on $[a,b]$

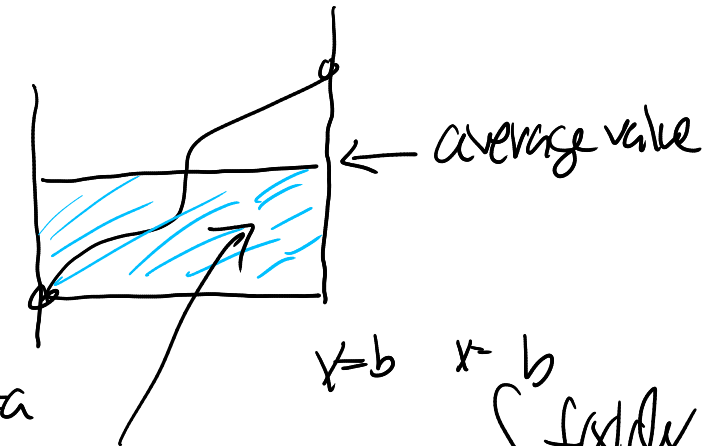


$$\frac{\int_{x=a}^{x=b} f(x)\,dx}{b-a}$$



side view of mountain





or big rectangle w/ area = $\int_{x=a}^{x=b} f(x)\,dx$