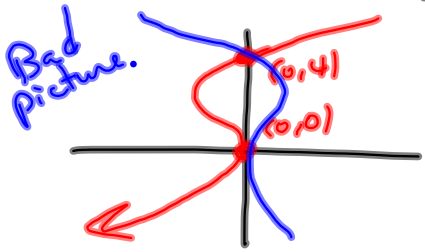
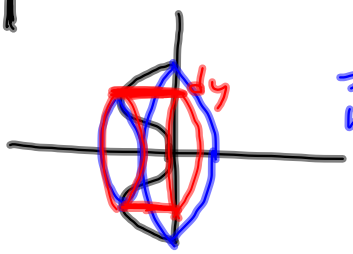
§5.3 #12

$x = 4y^2 - y^3$, $x = 0$ about x-axis

$= y^2(4 - y)$

$-x^3$





thickness = dy

height = $0 - (4y - y^3)$

$= y^3 - 4y^2$

radius = y

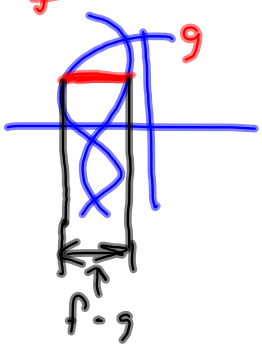
$$\text{Volume} = 2\pi \int_a^b y\, f(y)\, dy$$

$$= 2\pi \int_0^4 y\,(y^3 - 4y^2)\, dy$$

Area from a to c

is $\int |f| = \int_a^b f - \int_b^c f$

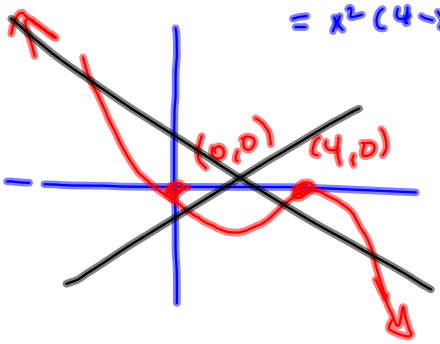
$-f = 0 - f$

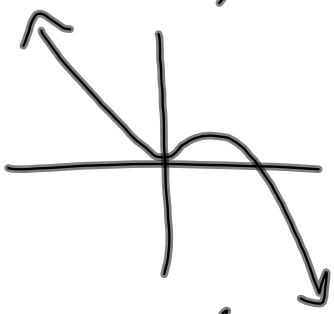


might be easier to swap vars.

$y = 0$ & $y = 4x^2 - x^3$

$= x^2(4 - x)$





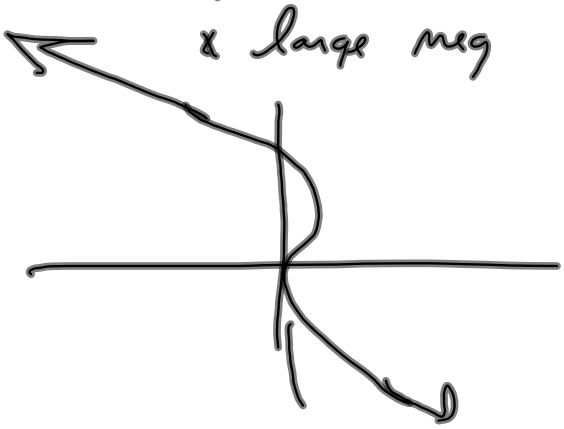
x large pos

$\Rightarrow$ y large neg

Swap.

y large pos

x large neg



§5.5 Mean Value Thm for Integrals

If f is cnts on $[a,b]$, then it achieves its average value.

Its average value is

$$f_{avg} = \frac{1}{b-a}\int_a^b f(x)\,dx$$

Nothing on how to FIND c $\exists$ $f(c)=f_{avg}$.
We just know that c exists!

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§5.4 Work

WORK = FORCE x DISTANCE

until now, you could only do a constant force. Now the force is variable.

$$\text{Work} = \int_a^b F(x)\,dx$$

How much work is done when a hoist lifts a 200 kg rock 3 m?

$W = F \cdot x$

$= 200 \cdot 3$

Not force! Need to work in gravity

$$\int_0^3 200\,dx = 200x\Big]_0^3 = 200 \cdot 3$$

$$F = (200\,kg)\left(9.8\,\frac{m}{s^2}\right) = 1960\,\frac{kg\text{-}m}{s^2} = 1960\,N$$

$$\int_0^3 1960\,dx = 1960 \cdot 3$$

A leaky sandbag would be one way to make the force be variable.

#s 11, 13, 14, 16, 17, 21, 23