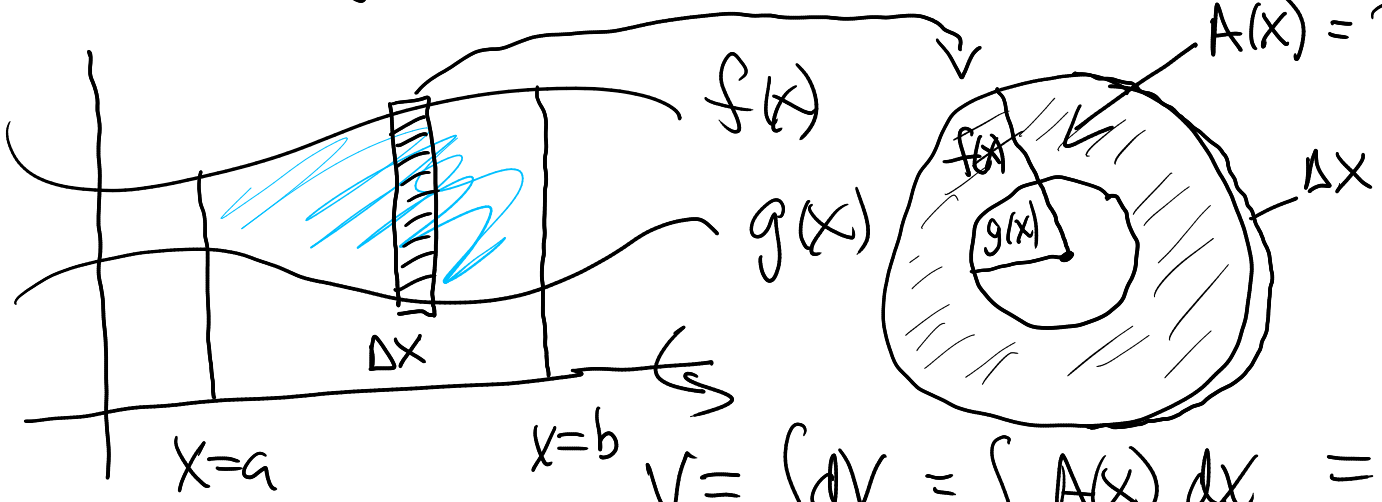
Math 181 Thursday, February 4 6.3/6.4

Washers (not discs)

Problem Area between

$y = f(x)$ & $y = g(x)$, $g(x) \le f(x)$, rotated around x-axis to form a solid of revolution.

5, 6



$$A(x) = \pi(f(x))^2 - \pi(g(x))^2$$

$$= \pi(f(x)^2 - g(x)^2)$$

$$V = \int dV = \int A(x)\,dx = \int_{x=a}^{x=b} \pi(f(x)^2 - g(x)^2)\,dx$$

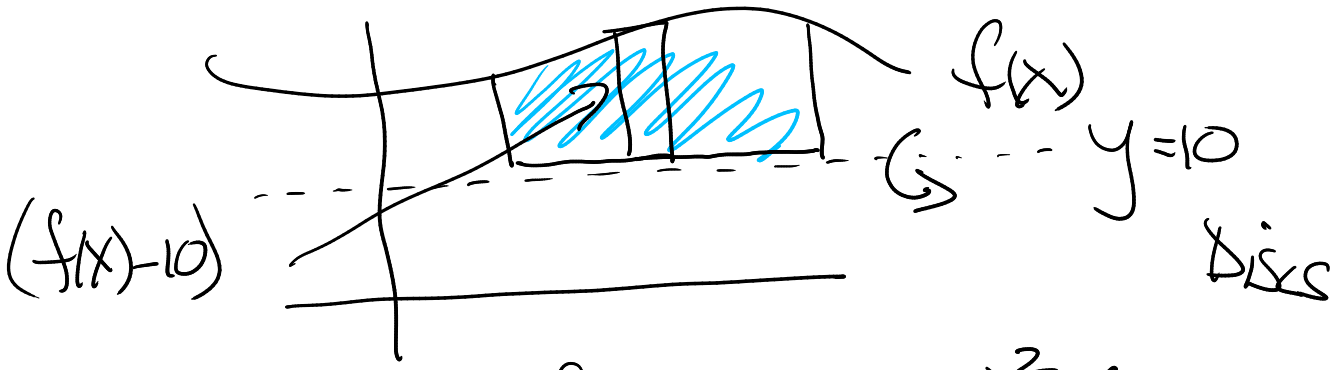
Fri - 6.4
BYOB - Beach Scene

Mon - 6.5

Tue - Problem Session

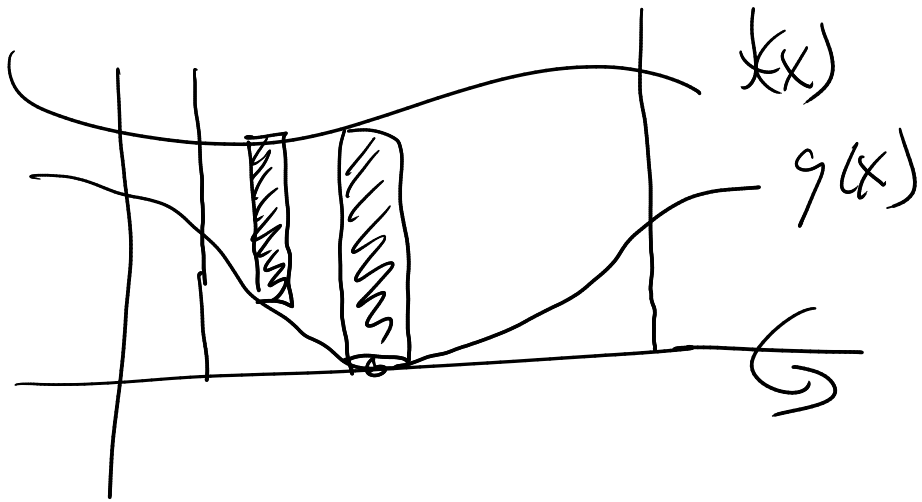
Tue - Exam 1

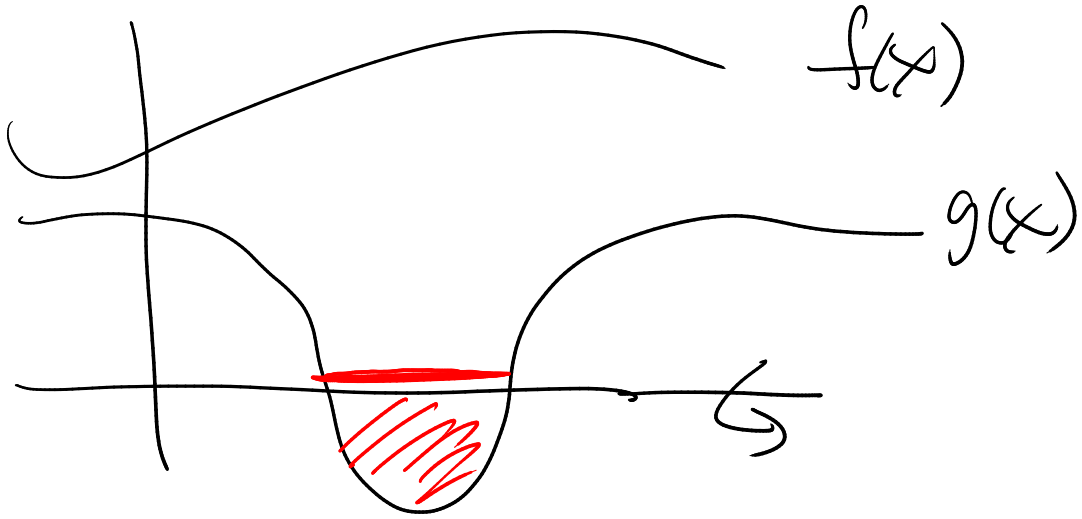
$$\int \pi f(x)^2 \, dx$$



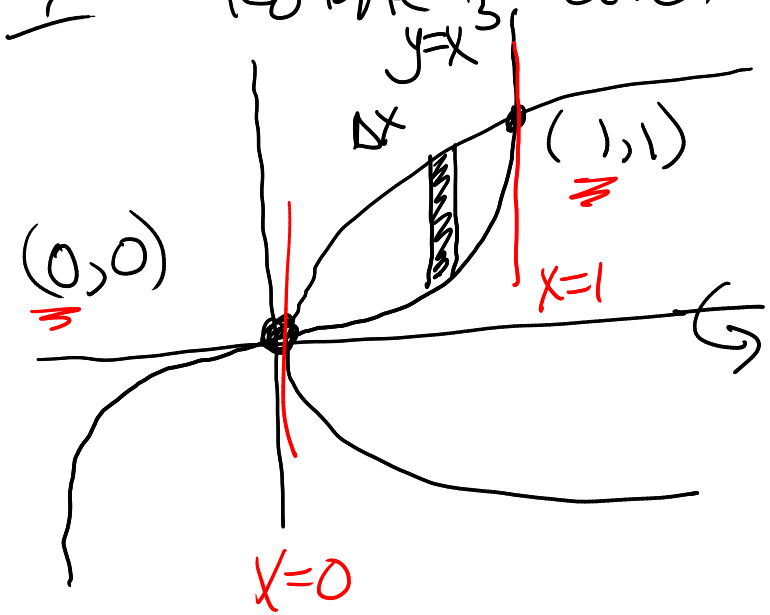
$$\int \pi (f(x)-10)^2 \, dx$$

Washers $\int \pi (f(x)^2 - 10^2) \, dx$





Ex Rotate area between $y^2 = x$ & $y = x^3$ around x-axis.



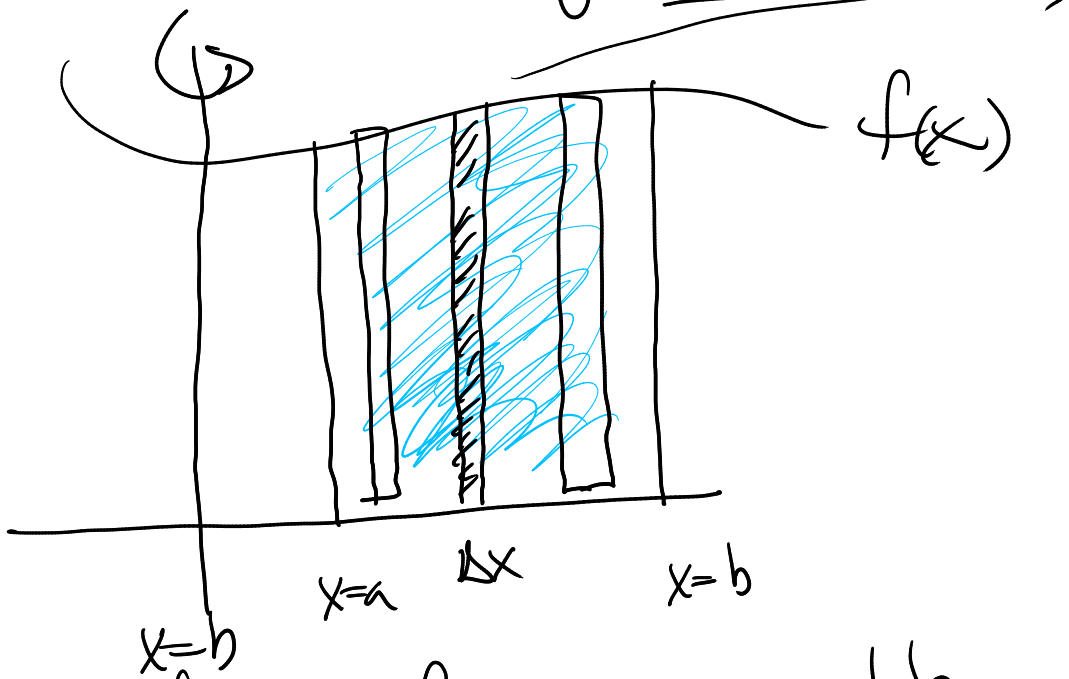
$x = y^2$

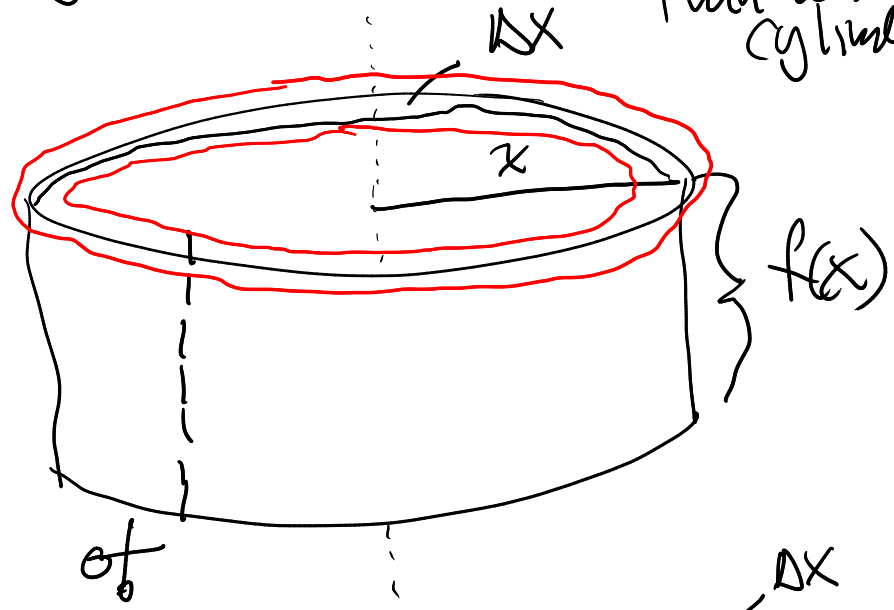
$y = \pm\sqrt{x}$

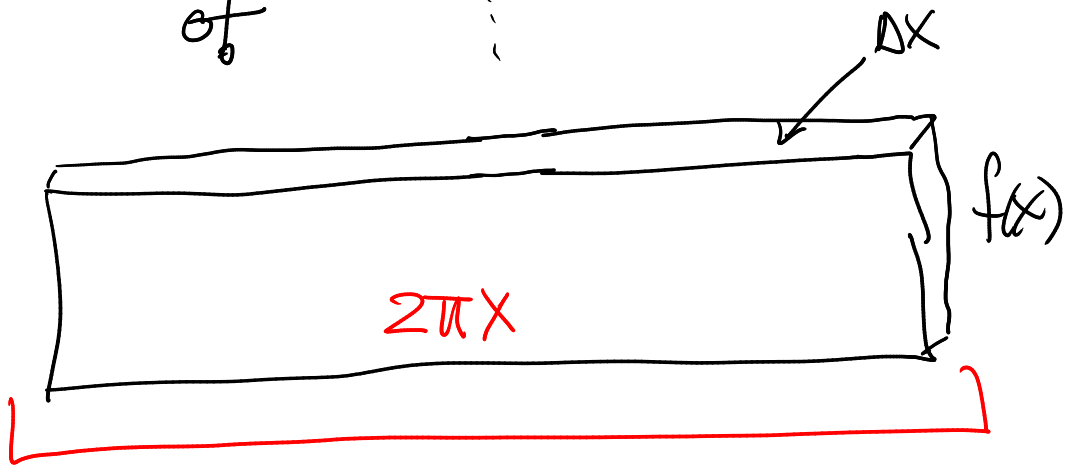
$$V = \int dV = \int_{x=0}^{x=1} \pi \left((\sqrt{x})^2 - (x^3)^2 \right) dx$$

Cylindrical Shells (Section 6.4)

Rotate area between x-axis & $y=f(x)$ & $x=a$ & $x=b$ around the y-axis.





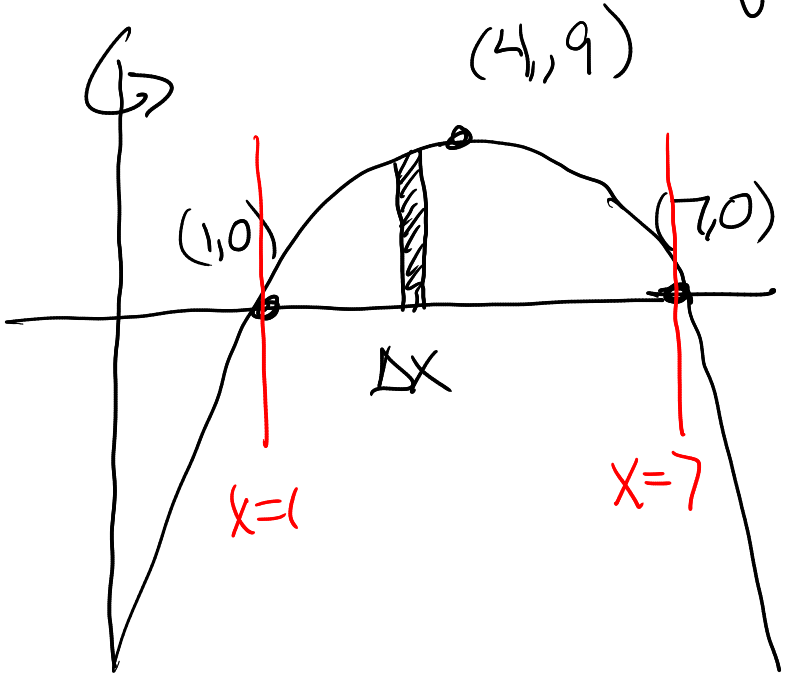


$$V = \int dV = \int_{x=a}^{x=b} 2\pi x\, f(x)\, dx$$

slab

Ex Area between $y = -x^2 + 8x - 7$ & x-axis &
rotate around y-axis

$y = -(x-1)(x-7)$



strip parallel to axis of rotation
⇒ shells

$$V = \int_{x=1}^{x=7} 2\pi x\left(-x^2+8x-7\right)\,dx$$

Q: Do it again, use Δy strip