QR5.

$$y = \ln(\sec x + \tan x)$$

$$\frac{1}{\sec x + \tan x} \cdot \sec x \tan x + \sec^2 x$$

$$\frac{\sec x(\tan x + \sec x)}{\sec x + \tan x}$$

22.

$$\int_0^{\frac{\pi}{4}} \sec^2 x \, dx$$

$$\tan x \Big|_0^{\frac{\pi}{4}} =$$

$$\tan\frac{\pi}{4} - \tan 0 =$$

$$1 - 0 = 1$$

30.

$$\int_1^4 -x^{-2}\,dx$$

$$-\int_1^4 x^{-2}\,dx = -\left(\frac{x^{-1}}{-1}\right)$$

$$x^{-1}\Big|_1^4 = 4^{-1} - 1^{-1}$$

$$\frac{1}{4} - 1 = -\frac{3}{4}$$

QR

7.

$$y = \frac{x^{n+1}}{n+1}$$

$$\frac{x^5}{5}$$

$$\frac{5x^4}{5}$$

$$\frac{(n+1)\,x^n}{n+1}$$

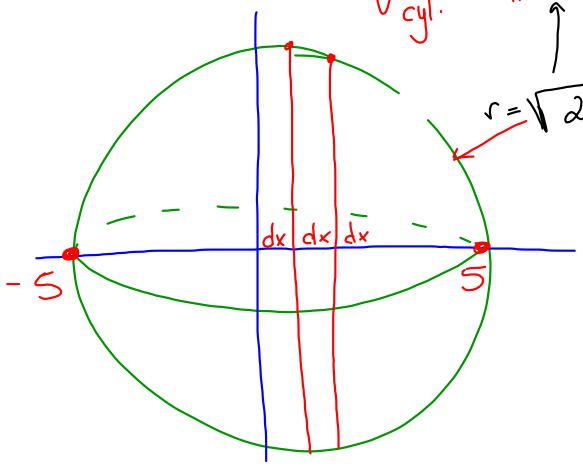
5.1 a

13.

$x^2+y^2=r^2$

$V_{cyl.} = \pi r^2 h$

$r = \sqrt{25-x^2}$



$V = \pi \left(\sqrt{25-x^2}\right)^2 dx$

$$\int_{-5}^{5} \pi(25-x^2)\, dx$$

28.

0	1	2	3	4	5
50	70	97	136	190	265

a.

Upper: $1(70+97+136+190+265)$

Lower: $1(50+70+97+136+190)$

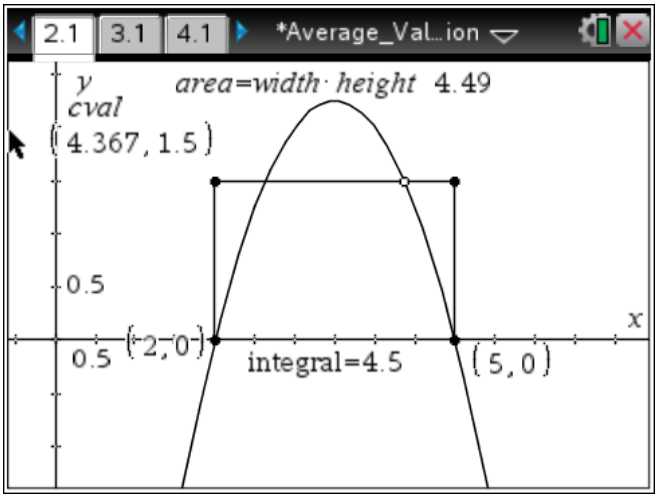
b. Upper 2363

Lower 1693

$$\frac{25000-2363}{720} =$$

5.3b Definite Integrals & Antiderivatives

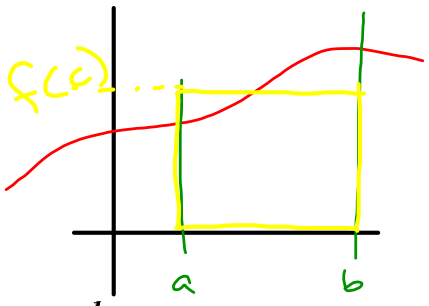
Average (Mean) Value



graphically?

$$av(f) = f(c) = \frac{1}{b-a}\int_a^b f(x)dx$$

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



$$av(f)(b-a) = f(c)(b-a) = \int_a^b f(x)dx$$

height base area under curve

Mean Value Thm for Definite Integrals

if f is continuous on [a,b], then there is some c value in [a,b]

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

how do you find the average of: 10,12,18,20

sum all the values and divide by 4

the idea is similar for a function:

if f is integrable on [a,b] then its avg. value on [a,b] is:

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

divide by how many values there are — sum all values

Find the average value of $f(x)=6-x^2$ on [0, 5]

$$f(c)=\frac{\int_0^5 (6-x^2)\,dx}{5-0}$$

$$\frac{\left(6x-\frac{x^3}{3}\right)\Big|_0^5}{5}$$

$$\frac{6(5)-\frac{5^3}{3}-\left(6(0)-\frac{0^3}{3}\right)}{5}=6-\frac{25}{3}=-\frac{7}{3}$$

Where does the average occur?

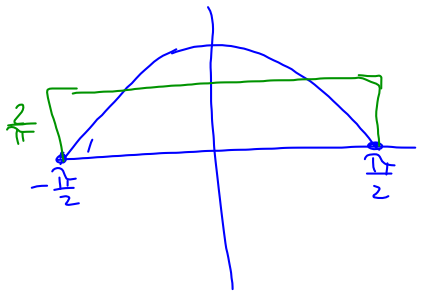
$$-\frac{7}{3}=6-x^2$$

$$x=\pm\frac{5}{\sqrt{3}} \qquad x=\frac{5}{\sqrt{3}}$$

Find the average: $\dfrac{\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (\cos x)\,dx}{\frac{\pi}{2} - \left(-\frac{\pi}{2}\right)} = \dfrac{\sin x \Big|_{-\frac{\pi}{2}}^{\frac{\pi}{2}}}{\pi}$

$\dfrac{\sin\frac{\pi}{2} - \left(\sin\left(-\frac{\pi}{2}\right)\right)}{\pi} = \dfrac{1 - (-1)}{\pi}$

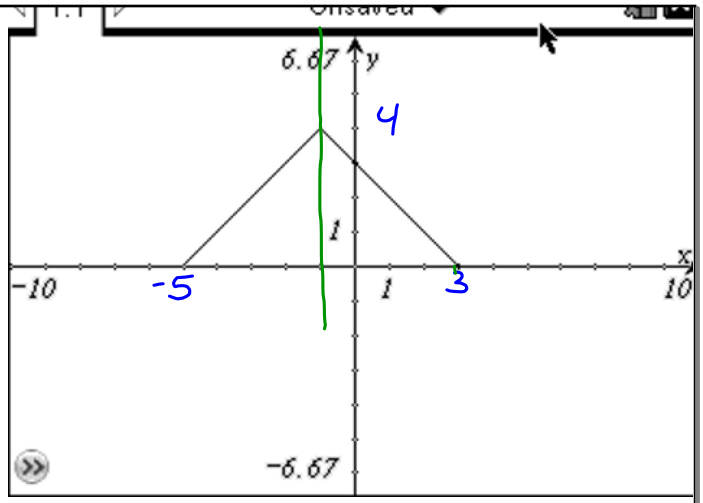
$\neq 1/2$



Area / interval

$A = \frac{1}{2} b \cdot h$

$A = \frac{1}{2} \cdot 8 \cdot 4 = 16$



Find the avg. value of the function on [-5,3], using geometry:

$Avg = \frac{16}{8} = 2$

$$f(x) = \begin{cases} -x+3, & -1 \le x \le 3 \\ x+5, & -5 \le x < -1 \end{cases}$$