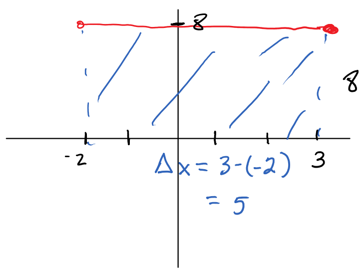
6.2 Day 2

Monday, November 4, 2019 8:54 AM

Graph $f(x) = 8$ over the interval $[-2, 3]$



Area under the curve to the x-axis?

$5(8) = 40$

★ Area under a curve $= \int_a^b f(x)\,dx$ iff $f(x)$ in non-negative

$$\int_{-2}^{3} f(x)\,dx = \int_{-2}^{3} 8\,dx = 8(3-(-2)) = 8(5) = 40$$

Theorem: The integral of a constant

If $f(x) = c$ where $c =$ constant on the interval $[a,b]$, then

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

you try.. Evaluate $\int_{-2}^{3} -8\,dx = -8(3-(-2)) = -40$

Evaluating Integrals using Geometry.

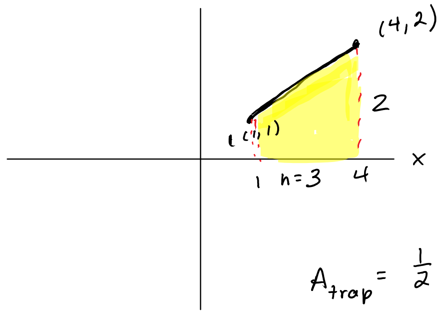
Evaluate:

f(x)

a. $\int_1^4 \left(\frac{1}{3}x + \frac{2}{3}\right) dx =$

$= \frac{1}{2}(3)(2+1) = \frac{1}{2}(3)(3)$

$= 9/2$



$h = \Delta x$

$A_{trap} = \frac{1}{2}h(b_1 + b_2)$

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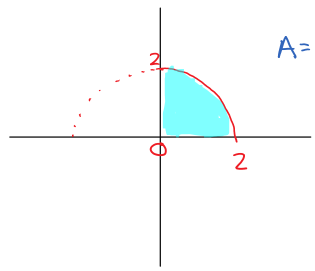
recall: $x^2 + y^2 = r^2$

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

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

evaluate: $\int_0^2 \sqrt{4 - x^2}\, dx$

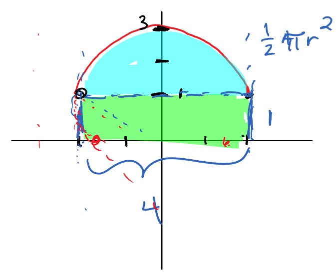


$A = \frac{1}{4}\pi r^2$

$= \frac{1}{4}\pi(2)^2$

$= \pi$

you try... $\int_{-2}^{2} \left(1 + \sqrt{4 - x^2}\right) dx$



$= \frac{1}{2}\pi(2)^2 + 4(1)$

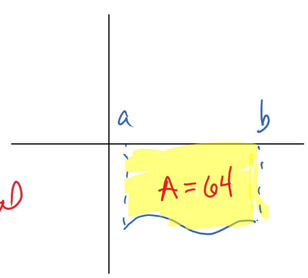
$= 2\pi + 4$

$f(x) < 0$?

$\int_a^b f(x)\, dx$

$= -64$

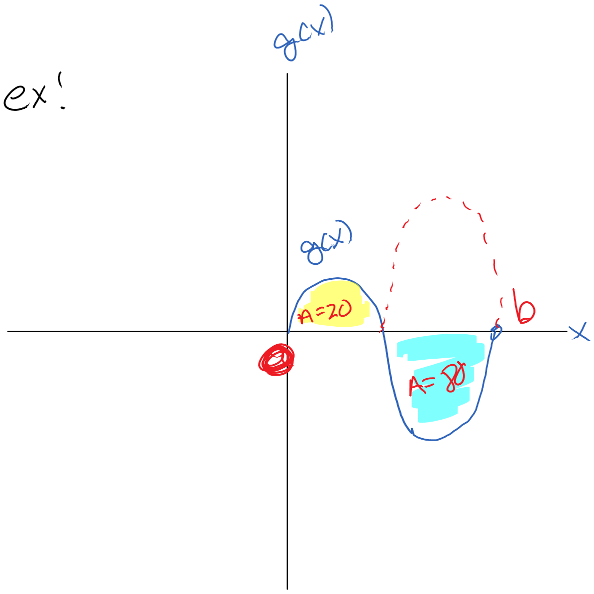
value of integral



Net Area: refers to the "positive" area combined w/ the "negative" area

Integral value $\int_a^b f(x)\,dx$ = Area above (x-axis) − area below (x-axis)

ex:



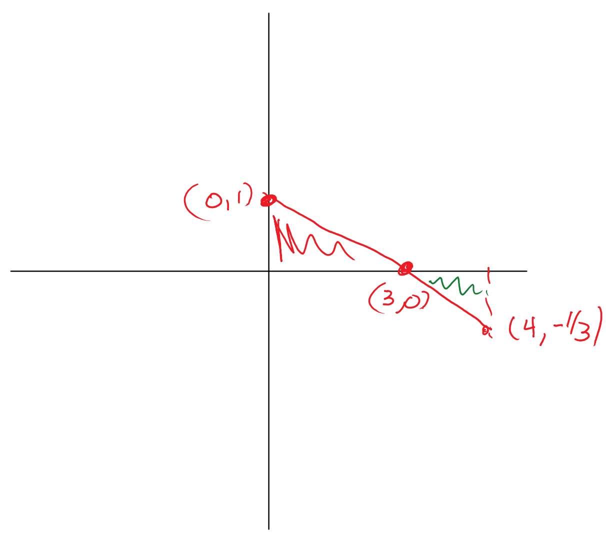
$$\int_0^b g(x)\,dx = 20 - 80 = -60$$

$$\text{Area} = \int_0^b |g(x)|\,dx = 20 + 80 = 100$$

ex: evaluate $\int_0^4 \left(-\frac{1}{3}x + 1\right) dx$

$$= \frac{1}{2}(3)(1) - \frac{1}{2}(1)\left(\frac{1}{3}\right)$$

$$= \frac{3}{2} - \frac{1}{6} = \frac{8}{6} = 4/3$$



★ use calculator to check above problem

you try $\int^{\pi} x\sin x\,dx$

you try $\int_0^{\pi} x \sin x \, dx$