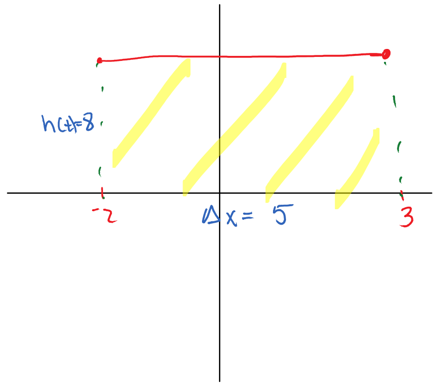
6.2 day 2

Friday, January 12, 2018 9:09 AM

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



$8(5) = 40$

or

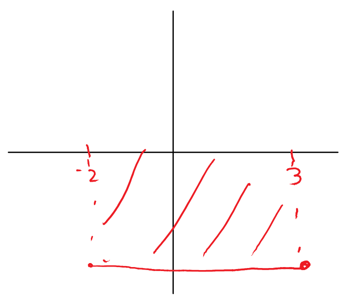
$\int_{-2}^{3} 8\,dx = 8(3) - 8(-2)$
$= 8(3-(-2))$
$= 8(5)$
$= 40$

Theorem: The integral of a constant

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

$$\int_a^b f(x)\,dx = \int_a^b c\,dx = c(b) - c(a) \text{ or } c(b-a)$$

you try. Evaluate $\int_{-2}^{3} (-8)\,dx = -8(3) - (-8)(-2)$
$= -24 - 16 = -40$



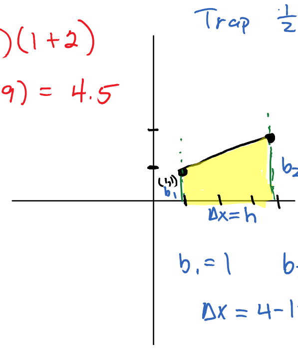
Evaluating Integrals using Geometry:

a. $\int_1^4 \left(\frac{1}{3}x + \frac{2}{3}\right)dx = \frac{1}{2}(3)(1+2)$
$= \frac{1}{2}(9) = 4.5$

Trap $\frac{1}{2}h\,(b_1 + b_2)$

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

x	f(x)
1	1
4	2



$b_1 = 1$ $b_2 = 2$

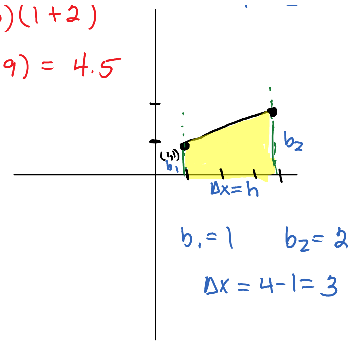
$\Delta x = 4 - 1 = 3$

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

$= \frac{1}{2}(9) = 4.5$

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

x	f(x)
1	1
4	2



$b_1 = 1 \qquad b_2 = 2$

$\Delta x = 4 - 1 = 3$

you try. -

b. $\int_1^3 \left(\frac{1}{2}x + 1\right) dx = \frac{1}{2}(2)(1.5 + 2.5)$

$= 4$

c. $\int_0^2 \sqrt{4 - x^2}\, dx$

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

hint:

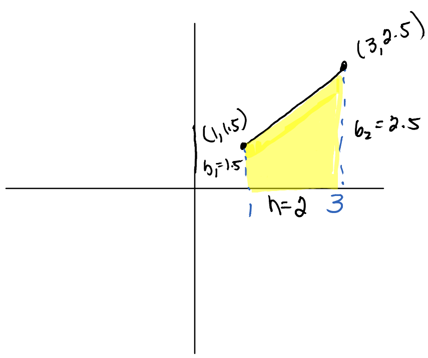
$x^2 + y^2 = r^2$

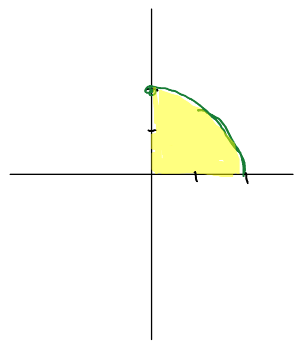
$y^2 = r^2 - x^2$

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

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

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

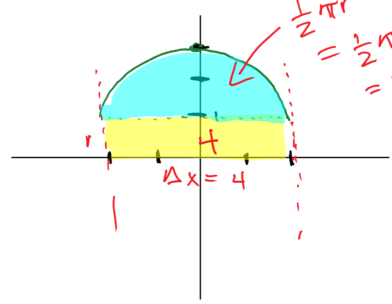




d. $\int_{-2}^{2} \left(1 + \sqrt{4 - x^2}\right) dx$

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

$= \boxed{4 + 2\pi}$



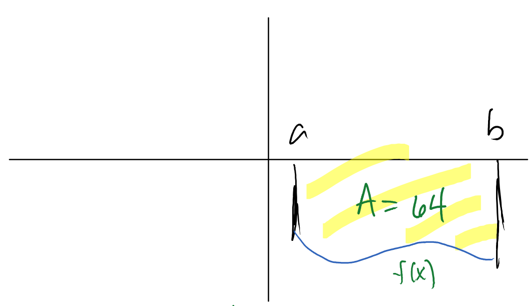
$\frac{1}{2}\pi r^2$

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

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

$= 2\pi$

$f(x) < 0 \quad [a, b]$



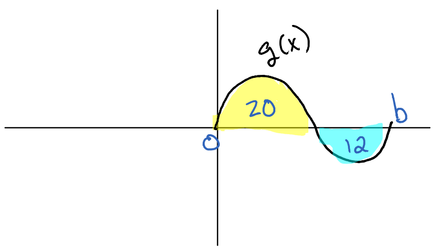
$\int_a^b f(x)\, dx = -64$

b

Net value $\int_a^b f(x)\,dx = -64$

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

$$\int_a^b f(x)\,dx = \text{Area above (x-axis)} - \text{Area below (x-axis)}$$



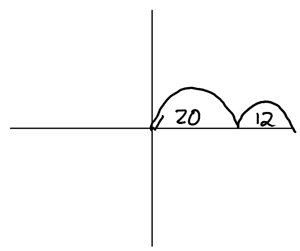
evaluate

$$\int_0^b g(x)\,dx = 20 - 12 = 8$$

Area

$$\int_0^b |g(x)|\,dx$$

$= 20 + 12 = 32$



Evaluate $\int_0^4 \left(-\tfrac{1}{3}x + 1\right) dx = \frac{4}{3}$

$= \frac{3}{2} - \frac{1}{6} = \frac{9}{6} - \frac{1}{6} = \frac{8}{6}$

$\frac{1}{2}(1)(3) = 1.5 = \frac{3}{2}$

$\frac{1}{2}(1)\left(\frac{1}{3}\right) = \frac{1}{6}$