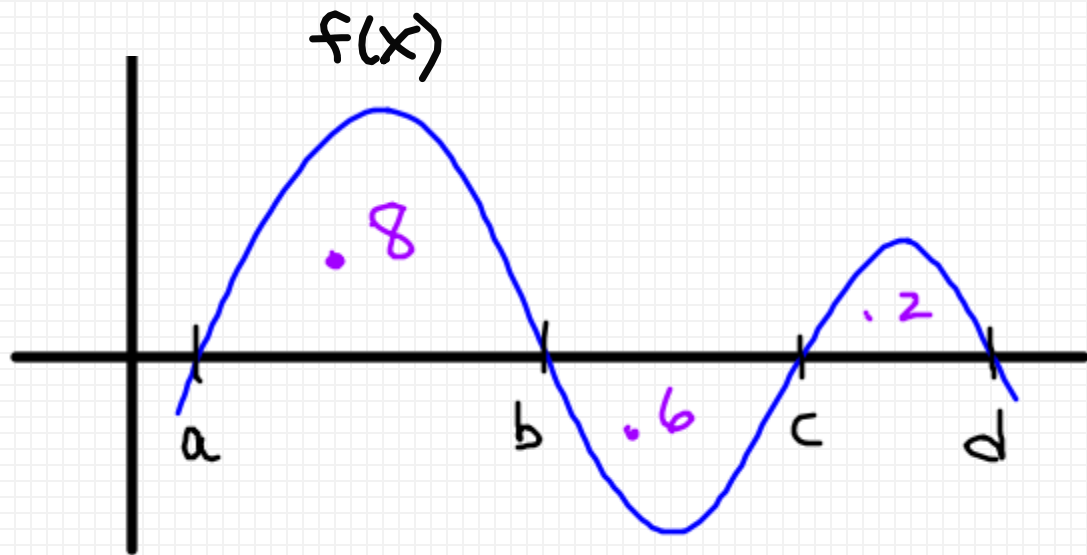


The Definite Integral

Section 5.2

Recall from AP Calc AB:



$$\textcircled{1} \int_a^b f(x) dx = -8$$

$$\textcircled{2} \int_b^c f(x) dx = -0.6$$

$$\textcircled{3} \int_d^c f(x) dx = -0.2$$

$$\textcircled{4} \int_a^d f(x) dx = 0.4$$

$$\textcircled{5} \int_b^b f(x) dx = 0$$

$$\begin{aligned} \textcircled{6} \int_b^d 5f(x) dx &= 5 \int_b^d f(x) dx \\ &= 5(-0.4) \\ &= -2 \end{aligned}$$



Properties of Definite Integrals $(a \leq b \leq c)$

$$\textcircled{1} \int_a^a f(x) dx = 0$$

$$\textcircled{2} \int_b^a f(x) dx = -\int_a^b f(x) dx$$

$$\textcircled{3} \int_a^b k f(x) dx = k \int_a^b f(x) dx$$

$$\textcircled{4} \int_a^b f(x) \pm g(x) dx = \int_a^b f(x) dx \pm \int_a^b g(x) dx$$

$$\textcircled{5} \int_a^c f(x) dx = \int_a^b f(x) dx + \int_b^c f(x) dx$$



Ex: Suppose $\int_1^5 f(x) dx = -1$ $\int_3^5 f(x) dx = 3$ $\int_3^5 g(x) dx = 4$

$$\int_1^3 f(x) dx = ?$$

$$\int_1^3 f(x) dx + \int_3^5 f(x) dx = \int_1^5 f(x) dx$$

$$\int_1^3 f(x) dx + 3 = -1$$

$$\int_1^3 f(x) dx = -4$$

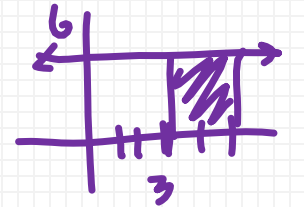
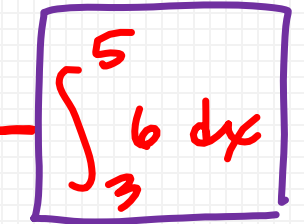
$$\int_5^3 \left[\underline{3}f(x) - \underline{2}g(x) + 6 \right] dx = ?$$

$$-3 \int_3^5 f(x) dx + 2 \int_3^5 g(x) dx - \int_3^5 6 dx$$

$$-3(3) + 2(4) - 12$$

$$-9 + 8 - 12$$

$$-13$$



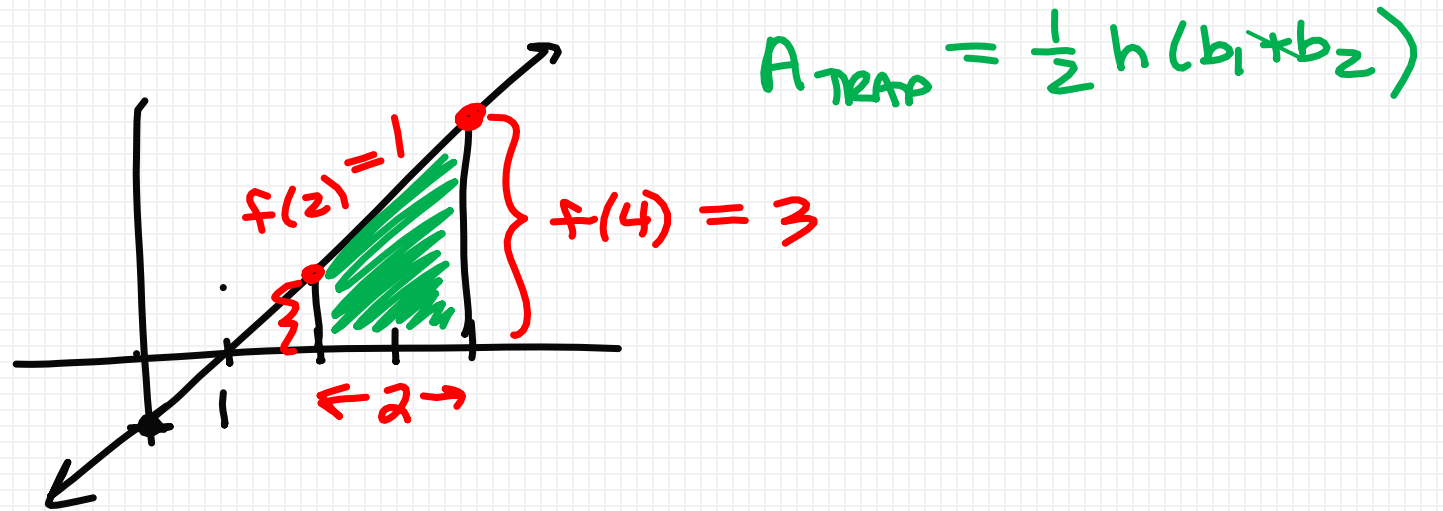
$$\int_a^b f(x) dx$$

Represents the net signed area between $f(x)$ and the x -axis. From a to b .

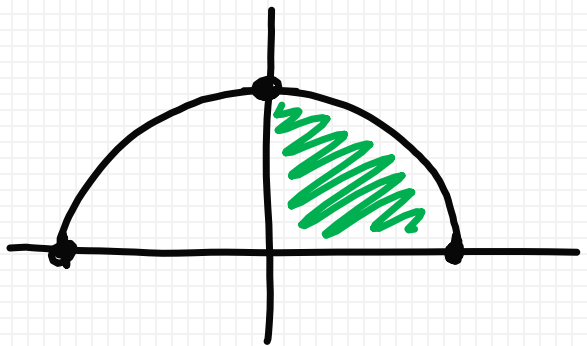
$$\int_2^4 x - 1 dx$$

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

$$= \textcircled{4}$$

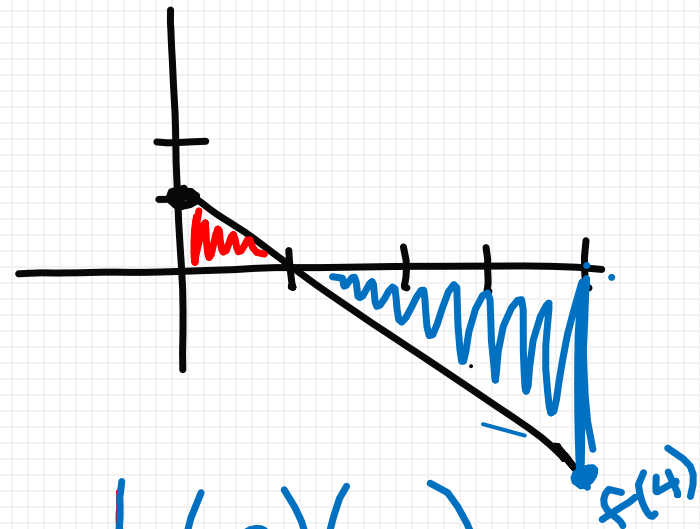


$$\int_0^1 \sqrt{1-x^2} dx$$



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

$$\int_0^4 1-x dx$$



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

$$\frac{1}{2} - \frac{9}{2}$$

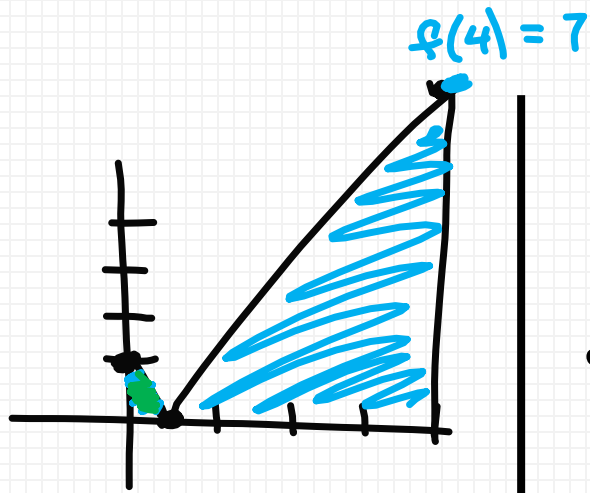
$$-\frac{8}{2} = \boxed{-4}$$



$$\int_0^4 |2x - 1| dx$$

$$|2x - 1| = 0$$

$$x = \frac{1}{2}$$



$$\frac{1}{2} \left(\frac{1}{2} \right) (1) + \frac{1}{2} \left(\frac{7}{2} \right) (7)$$

$$-\frac{1}{4} + \frac{49}{4}$$

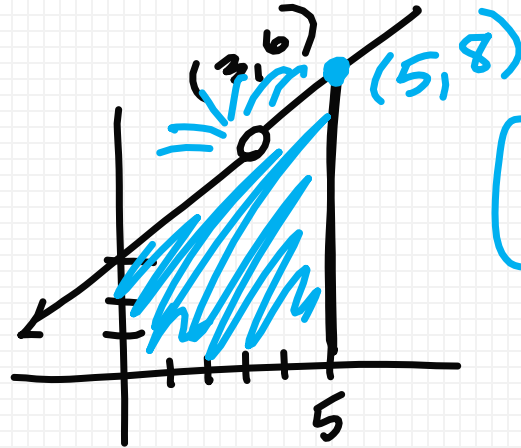
$$\frac{48}{4}$$

$$\frac{12}{1} = 12$$

$$\int_0^5 \frac{x^2 - 9}{x - 3} dx$$

$$\frac{(x-3)(x+3)}{\cancel{x-3}}$$

HOLE @ $x = 3$



$$\frac{1}{2} (5) (3 + 8)$$

$$\frac{55}{2}$$



Homework:

Section 5.2 – Definite Integral WS

