

4.3B Definite Integrals

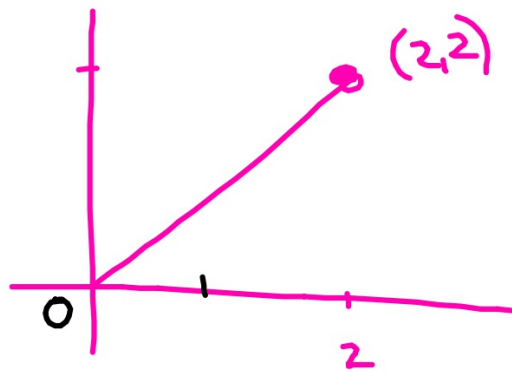
WCIID? I can evaluate definite integrals

A. Applications of area

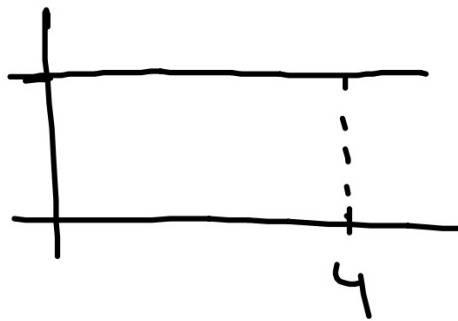
$$\int_a^b f(x) dx \rightarrow \text{Area}$$

Ex. $\int_0^2 x dx = 2$

$$\begin{aligned} A &= \frac{1}{2} \cdot b \cdot h \\ &= \frac{1}{2} (2)(2) \\ &= 2 \end{aligned}$$

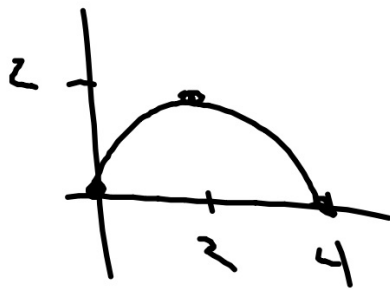


$$\text{Ex. } \int_0^4 2 \, dx = 8 \text{ z}$$



$$\text{Ex. } \int_0^4 f(x) \, dx = 2\pi$$

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

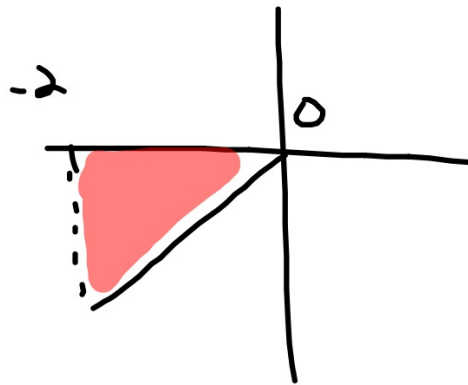


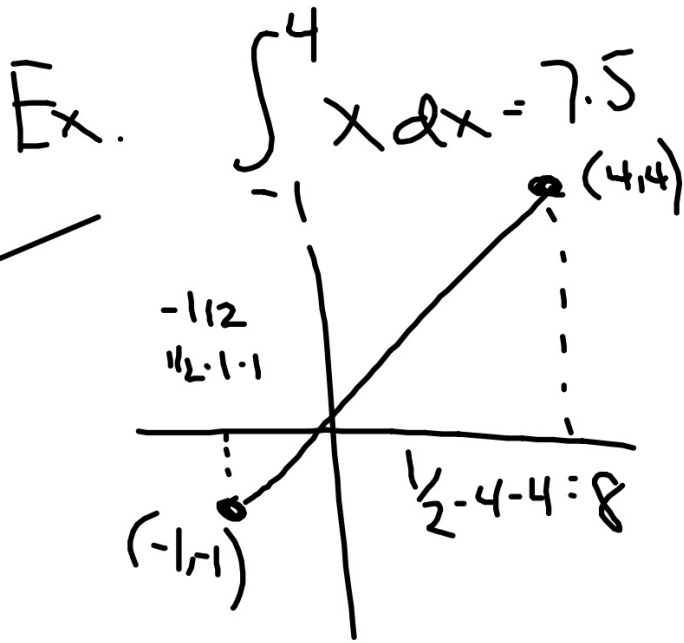
1. "Negative" Area

- More space below the x -axis than above

$$\text{Ex. } \int_{-2}^0 x dx$$

$$\begin{aligned} A &= \frac{1}{2} \cdot b \cdot h \\ &= \frac{1}{2} \cdot 2 \cdot 2 \\ &= 2 \end{aligned}$$

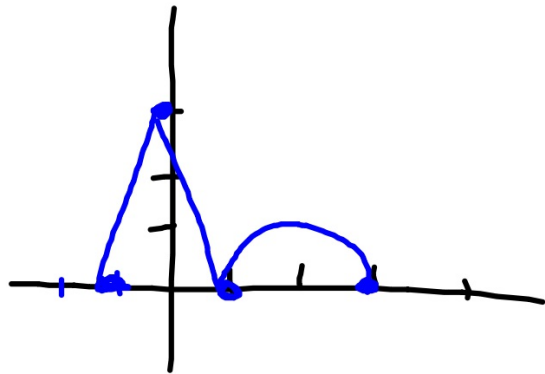




Ex. $\int_{-1}^4 f(x) dx$

$$A_T = A_1 + A_2$$

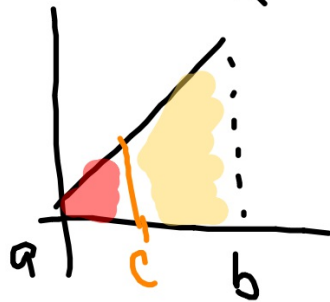
$$= 3 + \pi/2$$



B. Properties

1. If $a < c < b$ on $[a, b]$

$$\int_a^b f(x) dx = \int_a^c f(x) dx + \int_c^b f(x) dx$$



2. If f is integrable

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

$$7-5=2 \quad 5-7=-2$$

Ex. $\int_1^3 f(x) dx = 7 \rightarrow 21$

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

$\int_3^1 f(x) dx = -7$

$$3. \int_a^b K f(x) dx = K \int_a^b f(x) dx$$

$$4. \int_a^a f(x) dx = 0$$

Pg. 278

13-18

23-28

33-42

47 (not f)