

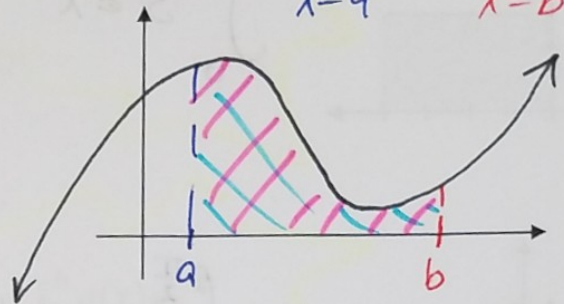
Calculus AB

Notes: Definite Integrals

Definite Integral

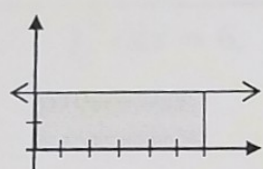
If f is Continuous and Non Negative on the closed interval $[a, b]$, then the area of the region bounded by the graph of f , the x-axis and the vertical lines $x=a$ and $x=b$ is given by:

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



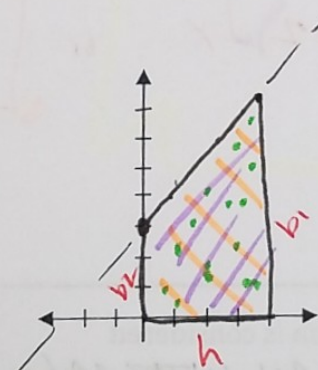
Ex 1: Find the area.

A. $\int_0^6 2 dx$



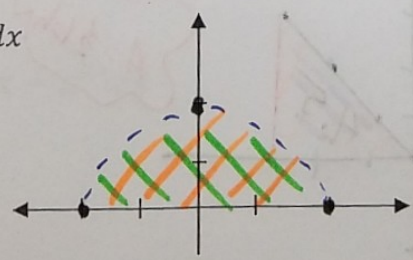
Rectangle
 $A = l \times w$
 $= 6 \times 2 = 12$

B. $\int_0^4 (x+3) dx$



Trapezoid
 $A = \frac{1}{2} (b_1 + b_2) h$
 $= \frac{1}{2} (3 + 7) 4$
 $= 20$

C. $\int_{-2}^2 \sqrt{4-x^2} dx$



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

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

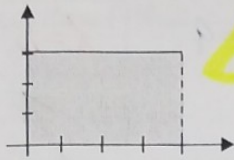
$$A = \frac{1}{2} \pi r^2$$

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

$$= 2\pi$$

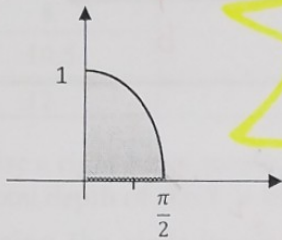
Ex 2: Write an integral that represents each of the following areas.

A.



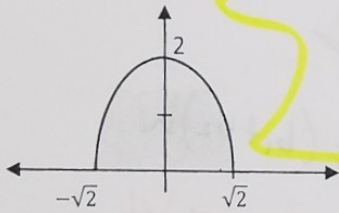
$$\int_0^4 3 dx$$

B.



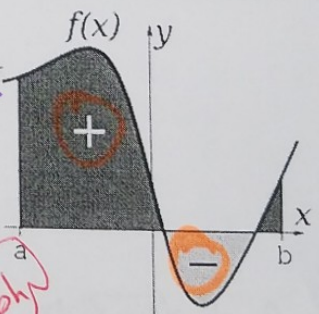
$$\int_0^{\pi/2} \cos x dx$$

C.



$$\int_{-\sqrt{2}}^{\sqrt{2}} (x^2 + 2) dx \quad \text{or} \quad \int_{-\sqrt{2}}^{\sqrt{2}} -(x^2 - 2) dx$$

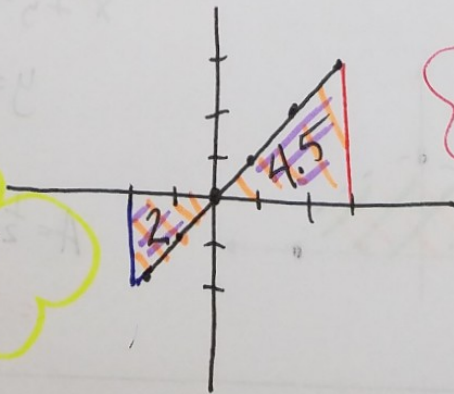
➤ If a graph falls below the x-axis that portion is considered "negative area" when EVALUATING AN INTEGRAL



Ex 3: Evaluate.

$$\int_{-2}^3 x dx$$

$$4.5 - 2 = 2.5$$



$$A = \frac{1}{2}bh$$