MATH 122

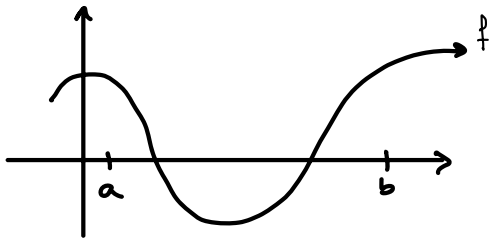
DEFINITE INTEGRALS

GOALS

- ☐ INTERPRET DEFINITE INTEGRALS AS NET SIGNED AREAS.
- ☐ USE FAMILIAR FORMULAS FROM GEOMETRY TO EVALUATE DEFINITE INTEGRALS
- ☐ EVALUATE A DEFINITE INTEGRAL FROM A GRAPH BY APPLYING PROPERTIES OF INTEGRALS

NET-SIGNED AREA:

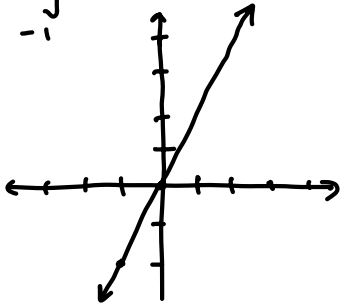
$$\lim_{n\to\infty} \sum_{k=1}^{n} f(x_k^*)\,\Delta x$$



NEW NOTATION: DEFINITE INTEGRAL.

$$\int_a^b f(x)\,dx$$: NET-SIGNED AREA FOR f OVER $[a,b]$

Ex: $\int_{-1}^{2} 2x\,dx$: NET-SIGNED AREA FOR $f(x) = 2x$ OVER $[-1, 2]$



WHY WE MIGHT WANT N.S.A.: AVERAGE OF A CONTINUOUS FUNCTION

Ex: $\int_{0}^{3} \sqrt{9 - x^2}\,dx$:

PROPERTIES:

① $\int_a^b f(x) + g(x)\,dx =$

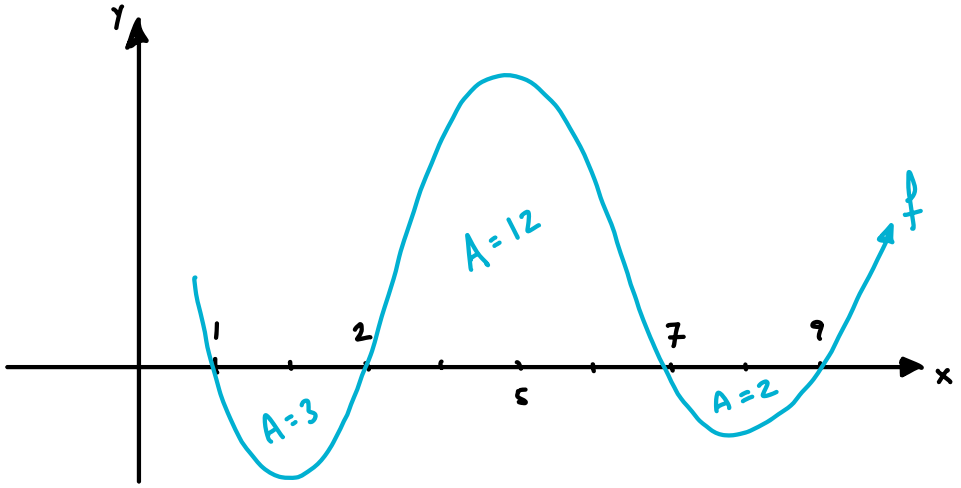
② $\int_a^b c f(x)\,dx =$

③ $\int_b^a f(x)\,dx =$

④ $\int_a^c f(x)\,dx =$

Ex: $\int_{-2}^{2} (3\sqrt{4 - x^2} + 2)\,dx =$

Ex: USE THE GRAPH OF f TO EVALUATE THE FOLLOWING DEFINITE INTEGRALS.



$$\int_1^9 f(x)\,dx =$$

$$\int_1^7 f(x)\,dx =$$

$$\int_9^2 f(x)\,dx =$$

$$\int_1^9 |f(x)|\,dx =$$