

Unit 6 Lesson 3: Properties of the Definite Integral

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Same upper & lower limit

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

Flipped upper & lower limits

if $\int_a^b f(x) dx = c$,

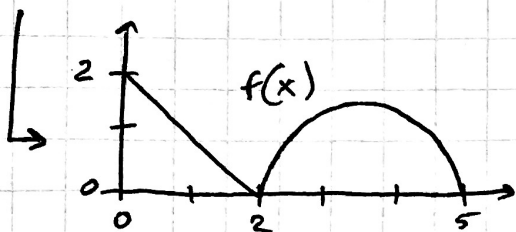
then $\int_b^a f(x) dx = -c$

Additive Interval Property

if $a < b < c$, then

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

$$\rightarrow \int_a^c f(x) dx$$



Triangle: $\int_0^2 f(x) dx$

Circle: $\int_2^5 f(x) dx$

$$\int_0^5 f(x) dx = \int_0^2 f(x) dx + \int_2^5 f(x) dx$$

Scalar Integral Rule

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

Negative Integral Rule

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

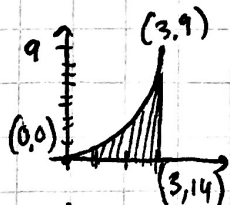
Sum Difference Rule

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

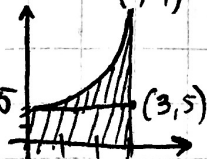
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$$\int_1^3 x+4 dx \rightarrow \int_1^3 x dx + \int_1^3 4 dx$$

$$\int_0^3 x^2 dx = 9$$

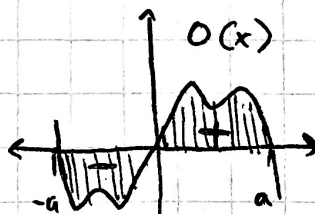


$$\int_0^3 x^2 + 5 dx = 24$$

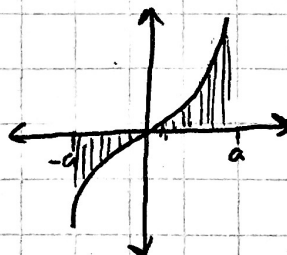


$$\begin{array}{r} 3 \times 5 = 15 \\ + 9 \\ \hline 24 \end{array}$$

Odd functions

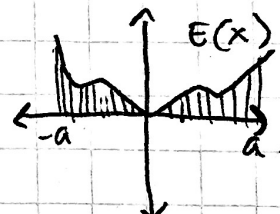


$$\int_{-a}^a O(x) dx = 0$$



• cancels out

Even functions



$$\int_{-a}^a E(x) dx = 2 \int_0^a E(x) dx$$

• same, same sign, just double it