4.3 Riemann Sums and Definite Integrals

indefinite

$$\int (x+1)\,dx$$

answer is an expression

definite

$$\int_2^5 (x+1)\,dx$$

answer is a number

Definite Integral Properties

① $\int_a^a f(x)dx = 0$

② $\int_a^b kf(x)dx = k\int_a^b f(x)dx$

*③ $\int_a^b (f(x)+g(x))dx = \int_a^b f(x)dx + \int_a^b g(x)dx$

④ $$\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$$

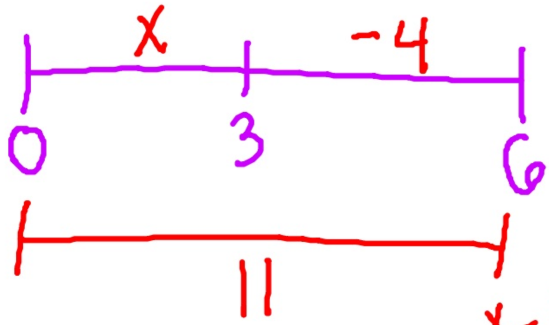
⑤ $$\int_a^c f(x)\,dx = \int_a^b f(x)\,dx + \int_b^c f(x)\,dx$$

#1 $\int_3^6 f(x)\,dx = -4$ $\int_0^6 f(x)\,dx = 11$

a.) $\int_6^3 f(x)\,dx = 4$

b.) $\int_0^6 3f(x)\,dx = 33$

c.) $\int_0^3 f(x)\,dx = 15$



$x - 4 = 11$

$x = 15$

#2 Evaluate $\int_1^3 (-x^2 + 4x - 3)\,dx$ using each of the following values.

$$\int_1^3 x^2\,dx = \frac{26}{3}, \qquad \int_1^3 x\,dx = 4, \qquad \int_1^3 dx = 2$$

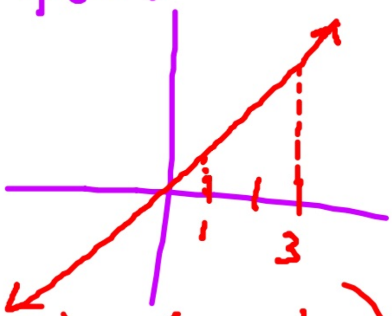
$$\int_1^3 -x^2\,dx + \int_1^3 4x\,dx + \int_1^3 -3\,dx$$

$$-\int_1^3 x^2\,dx + 4\int_1^3 x\,dx - 3\int_1^3 dx$$

$$\frac{-26}{3} + 16 - 6 = -\frac{26}{3} + 10 = \frac{4}{3}$$

$$\int_1^3 x\,dx$$

$$f(x) = x$$



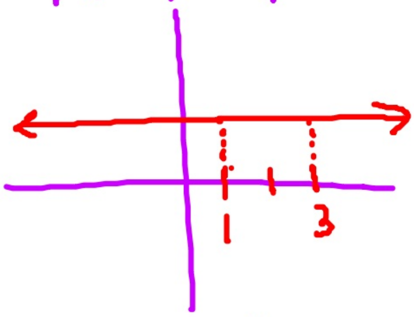
$$\frac{1}{2}h(b_1+b_2)$$

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

$$4$$

$$\int_1^3 dx$$

$$f(x)=1$$



$$bh$$

$$(2)(1)$$

$$2$$