



November 20

How do you know if the value of a definite integral will be positive or negative?



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Students will verbally explain how to find the exact area under a curve using definite integrals
(using the words:
right, left, above, below, antiderivative...)



Order of Integration	$\int_a^b f(x) dx = -\int_b^a f(x) dx$
Zero	$\int_a^a f(x) dx = 0$
Constant Multiple	$\int_a^b k \cdot f(x) dx = k \int_a^b f(x) dx$ For any number k
Additivity	$\int_a^b f(x) dx + \int_b^c f(x) dx = \int_a^c f(x) dx$
Constant Multiple (special case)	$\int_a^b -f(x) dx = -\int_a^b f(x) dx \quad k = -1$
Sum and Difference	$\int_a^b f(x) \pm g(x) dx = \int_a^b f(x) dx \pm \int_a^b g(x) dx$
Quotient Rule	Product Rule

Given

$$\int_2^9 g(x) dx = -8$$

$$\int_2^4 f(x) dx = 7$$

$$\int_2^9 f(x) dx = -2$$

Find

$$\int_2^9 4f(x) dx$$

$$\int_9^2 g(x) dx$$

$$\int_4^9 f(x) dx$$

given = -2

$$= 4 \int_2^9 f(x) dx = 4(-2) = -8$$

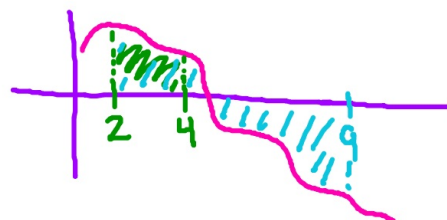
$$= -\int_2^9 g(x) dx = -(-8) = 8$$

$$\int_2^4 f(x) dx + \int_4^9 f(x) dx = \int_2^9 f(x) dx$$

$$7 + \int_4^9 f(x) dx = -2$$

$$-7$$

$$\int_4^9 f(x) dx = -9$$



IF

$$\int_1^7 f(x) dx = 9$$

$$\int_7^{10} f(x) dx = -2$$

$$\int_1^5 f(x) dx = 3$$

Find

$$\int_1^{10} f(x) dx$$

Find

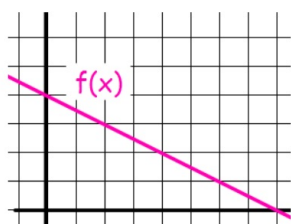
$$\int_5^7 f(x) dx$$

$$= \int_1^7 f(x) dx + \int_7^{10} f(x) dx = 9 + -2 = 7$$

$$\int_1^5 f(x) dx + \int_5^7 f(x) dx = \int_1^7 f(x) dx$$

$$3 + \int_5^7 f(x) dx = 9$$

$$\int_5^7 f(x) dx = 6$$



$$\int_0^8 f(x) dx$$

$$\int_0^8 5f(x) dx$$

$$\int_8^0 f(x) dx$$

$$\int_0^8 f(x) + 5 dx$$

$$= A \text{ of triangle} = \frac{1}{2}(b)(h) = \frac{1}{2}(8)(4) = 16$$

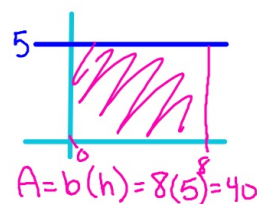
$$\int_0^8 f(x) dx = 16$$

$$= 5 \int_0^8 f(x) dx = 5(16) = 80$$

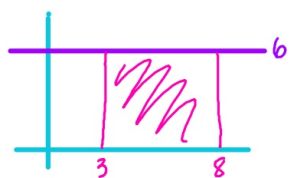
$$= - \int_8^0 f(x) dx = -(16) = -16$$

$$= \int_0^8 f(x) dx + \int_0^8 5 dx$$

$$16 + 40 = 56$$



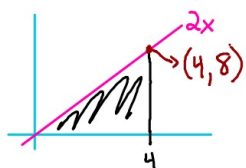
$$\int_3^8 6 \, dx$$



$$A = b(h) = 5(6) = 30$$

$$\int_3^8 6 \, dx = 30 \quad \leftarrow 8-3$$

$$\int_0^4 2x \, dx$$



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

$$= \frac{1}{2}(4)(8) = 16$$

$$\int_0^4 2x \, dx = 16$$