



Notes on the Fundamental Theorem of Calculus

FTC How to evaluate a definite integral

If f is continuous at every point of $[a, b]$ and if F is any antiderivative of f on $[a, b]$, then

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

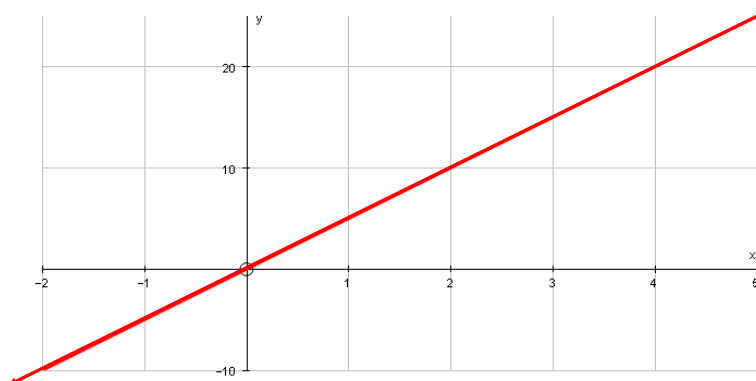
1.) $\int_0^5 (x^2 - 2x + 1) dx =$

2.) $\int_2^3 8x(x^2 - 5)dx$

3.) Use definite integrals to calculate the area between $y = 5x$ and the x - axis on the interval $[-2, 4]$.

a.) Setup the definite integral and then evaluate using the FTC.

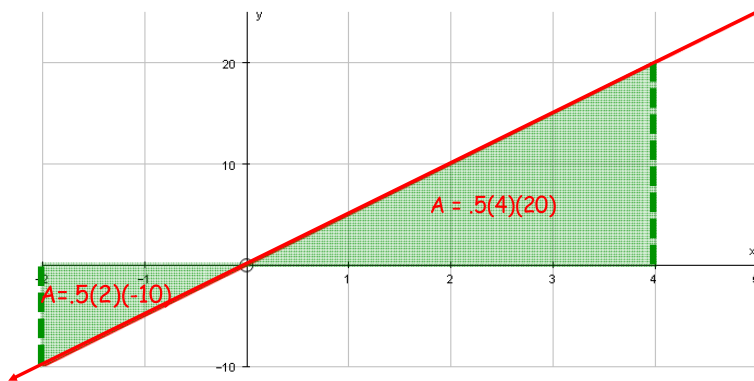
b.) Verify your findings by drawing the graph and using geometric formulas to find the area.



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For the following problem use $s(t)$ for position of an object at time t , and $v(t)$ for velocity of an object at time t .

4.) Suppose an object is moving away from you, in one direction, at a variable rate (velocity is always changing) along a straight line for 8 seconds. At time $t = 3$ seconds, the object is 105 feet away from you, $s(3) = 105$, and at time $t = 8$ seconds, the object is 275 feet away from you, $s(8) = 275$. How much distance did that object cover in the 5 seconds it traveled? How did you come about your answer?

One way to think of that is $s(8) - s(3)$. Position at time 8, minus the position at time 3.

You know that the **antiderivative of a velocity function, is the position function**. Knowing this, **evaluate** the following definite integral, and **explain** what its value represents according to the context of the problem above.

$$\int_3^8 v(t) dt =$$

Homework:

- 1.) Finish this worksheet
- 2.) P.429 5 - 10, 27, 30