

November 13

How can you use RAM to help you find the exact value of the area under a curve?

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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...)

Definite Integral

$$\lim_{n \rightarrow \infty} \sum_{k=1}^n f(x_k) \Delta x = \int_a^b f(x) dx$$

bounds
function
with respect to x

exact area between the curve, $f(x)$, and the x-axis from $x=a$ to $x=b$
"Integral of $f(x)$ from a to b "

Definite Integral Student Activity

Name _____
Class _____

Open the TI-Nspire document Definite_Integral.

In this activity, you will use a graphical representation to explore the definite integral of a continuous function. You will change the upper and lower limits, a and b , of the integral $\int_a^b f(x) dx$ and observe the resulting changes in the graph and the value of the definite integral.

Move to page 1.2.

Press $\left[\text{2ND}\right]$ $\left[\text{F5}\right]$ and $\left[\text{F6}\right]$ to navigate through the lesson.

1. The graph shows the function $y = f(x)$. The definite integral of $f(x)$ from a to b is given by $\int_a^b f(x) dx$. For example, $\int_0^2 f(x) dx$ is the definite integral of $f(x)$ from 0 to 2, or between $x = 0$ and $x = 2$.

Drag points a and b along the x-axis to determine the values of the following definite integrals, where f is the function shown in the graph.

a. $\int_0^1 f(x) dx =$ _____
b. $\int_1^2 f(x) dx =$ _____
c. $\int_0^2 f(x) dx =$ _____

2. Drag point a to -1 and move point b to determine the following:

a. For what values of b is $\int_{-1}^b f(x) dx$ positive? What do you observe about the shaded region and the graph of $f(x)$ when $\int_{-1}^b f(x) dx$ is positive?

b. For what values of b is $\int_{-1}^b f(x) dx$ negative? What do you observe about the shaded region and the graph of $f(x)$ when $\int_{-1}^b f(x) dx$ is negative?

c. For what values of b does $\int_{-1}^b f(x) dx = 0$? What do you observe about the shaded region and the graph of $f(x)$ when $\int_{-1}^b f(x) dx = 0$?