Area Function Demonstration
Student Activity

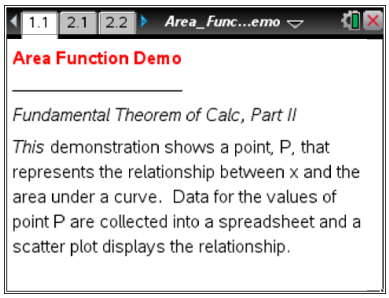
Name _____

Class _____

Open the TI-Nspire document *Area_Function_Demo.tns.*

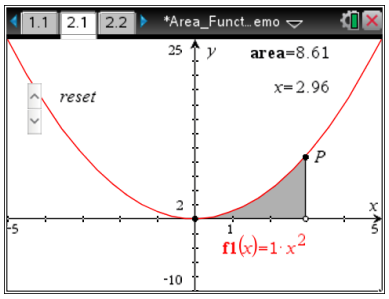
Objective: To make a connection between the area under a derivative curve and the function that represents the antiderivative.

Directions: Follow the steps below to complete the activity.



Move to page 2.1.

Example: On this page, the function graphed is **f1**(x) = x^2. The x-value of the right interval and the area under the curve from zero to the x-value are shown. Point P represents the coordinates (x-value, area under the curve).

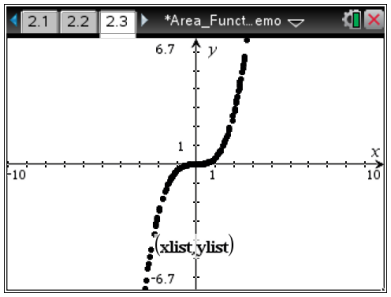


Move the empty circle on the x-axis and watch the tangent line and point P move.

1. Can you predict what function point P is tracing?

Move to page 2.3.

You will see a scatter plot of the points that P traced on the screen.

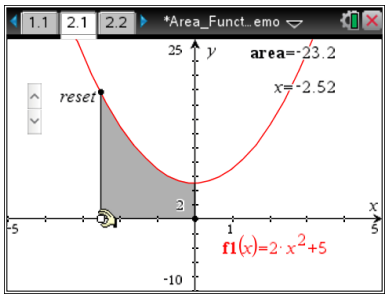


Enter your prediction function in the entry line for **f**3(x) and see if your prediction matches the scatter plot. You can change the function you enter as many times as needed until you get a match.

The function that matches the scatter plot is called the antiderivative function.

2. What is the antiderivative function of **f**(x) = x^2?

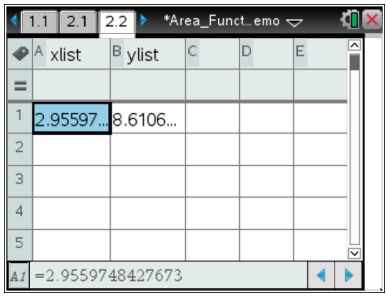
To explore other functions, use these steps to change the function and clear the collected data:



Step 1: Go to page 2.1 and change the function by clicking on **f**1(*x*) and editing the equation in the entry line.

Step 2: Go to page 2.2, highlight a cell in column A, and then select **Actions > Select > Select Column**.

- While column A is highlighted, hold shift and press ▶ to highlight column B.
- With columns A and B highlighted, select **Menu > Data > Clear Data**.



Step 3: Return to page 2.1 and begin the lesson steps again.

Exploration 1: Now that you have found the antiderivative function for **f**(*x*) = x^2, explore some other variations of this function and see if you can find a pattern in their antiderivatives.

3. Record the antiderivative functions and any patterns you saw here:
   a. **f**(*x*) = ax^2, where *a* equals 2, 3, 4, etc., until you see a pattern.

   b. **f**(*x*) = $ax^2 + b$; keep *a* constant and change *b.*

Exploration 2: Begin by finding the antiderivative function for **f**(*x*) = x^3.

What is the antiderivative function of **f**(*x*) = x^3?

Now explore some other variations of this function and see if you can find a pattern in their derivatives.

4. Record the derivative functions and any patterns you saw here:
   a. **f**(*x*) = ax^3, where *a* equals 2, 3, 4, etc., until you see a pattern.

   b. **f**(*x*) = $ax^3 + b$; keep *a* constant and change *b.*