Graphs of Anti-derivatives

Student Activity

7 8 9 10 **11** **12**

TI-Nspire™ | Activity | Student | 50 min

Objective

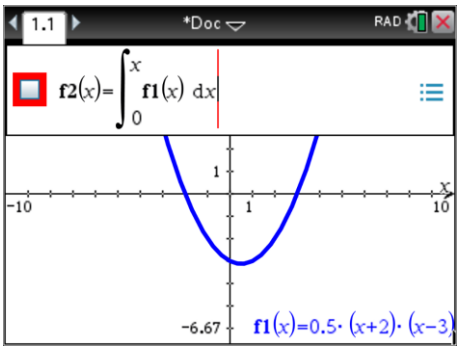
Plot an antiderivative graph of a given function and make connections between the antiderivative graph and the original function graph.

Exploration

Start a new TI-Nspire document and insert a Graph Application.

Enter the equation: $y = 0.5(x+2)(x-3)$

By default this equation will be located in: $f_1(x)$. An anti-derivative of this function can be graphed using the definite integral. The definite integral template can be entered from the templates menu or by using the short cut combination: [Shift] + [+]



Note: The use of a 0 and x in the terminals will be explored later.

Question 1:

The anti-derivative graph for each of the following functions will be explored.

a. $y = 0.5(x+2)(x-3)$ b. $y = x^3 - 2x^2 + x - 1$ c. $y = 2\cos^2\left(\frac{x}{2}\right)$

d. $y = \frac{\sin(x)}{x}$ e. $y = 200x \times 2^{-x}$ f. $y = |x|$

For each pair of graphs, comment upon and draw applicable region(s) for the original function and the graph of the anti-derivative where the original function:

- Crosses the *x*-axis from negative to positive
- Crosses the *x*-axis from positive to negative
- Has a turning point not touching the *x*-axis
- Has a turning point touching the *x*-axis
- Has a stationary point of inflection

Calculator Tips

- When the equation in $f_1(x)$ is updated the anti-derivative updates automatically.
- Zoom Box or Zoom In / Out can be used to focus on specific areas of the graph.
- Graph labels can be automatically hidden via the Graph Application settings menu.

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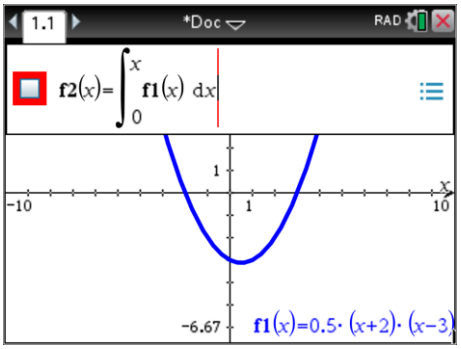
Extension

So far the purpose of the terminals has largely been ignored. Define the graph of $f_3(x)$ as:

$$\int_1^x f_1(x)dx$$



Define the graph of $f_4(x)$ as:

$$\int_{-1}^x f_1(x)dx$$

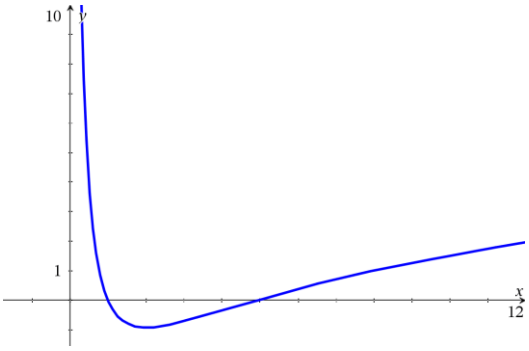
Question 2:

Comment on how the terminal(s) change the graph of the anti-derivative graph.

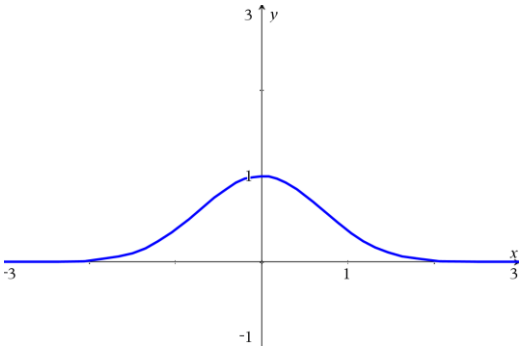
Sometimes we know the rate at which a function changes (derivative) but for a variety of regions we are unable to determine the corresponding anti-derivative. For the following two graphs draw the anti-derivative function, remember to cross-check your notes against the various applicable section of each curve.

Question 3:

a)



b)



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