

Numerical Integration & Area Under a Curve Kevin Fitzpatrick • CC Edwards

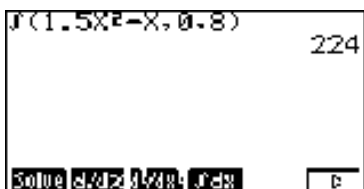
CALCULATORS: Casio: *fx-9750G Plus & cfx-9850G Series*

TI: *TI-83 Plus, TI-84 Plus & TI-83/TI-84 Plus Silver Editions*

CASIO GRAPHING CALCULATORS

Evaluating $\int_0^2 (1.5x^2 - x) dx$ on the Home screen:

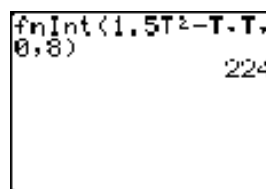
1. Press **MENU** and **1** to select the RUN screen. (That's the main calculation screen.)
User note: You can also use the arrows to highlight the RUN screen and press EXE.
2. Press the **OPTN** key, then **F4(CALC)**, then **F4**.
3. Enter the function you want to integrate (be sure to use x as the variable in the function) then, lower bound, upper bound.
4. Press **)** to close the parentheses and then press **EXE** to evaluate the definite integral.



TI GRAPHING CALCULATORS

Evaluating $\int_0^2 (1.5x^2 - x) dx$ on the Home screen:

1. Press **MATH** then the **up arrow twice** then **ENTER** to select the fnInt option from the MATH/MATH menu.
2. Enter the function you want to integrate and press **,**. (You may use any letter for the function variable.)
3. Enter the letter of the function variable and press **,**.
4. Enter the lower limit for the integral and press **,**.
5. Enter the upper limit for the integral.
6. Press **)** to close the parentheses and then press **ENTER** to evaluate the definite integral.



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continued

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CASIO GRAPHING CALCULATORS

Graphing $f(x) = 1.5x^2 - x$:

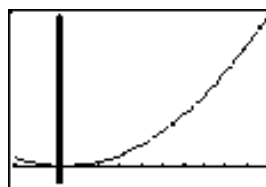
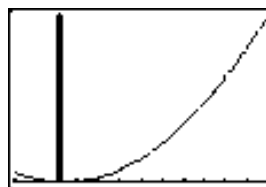
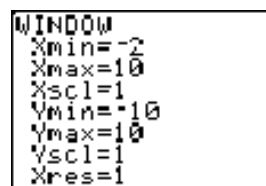
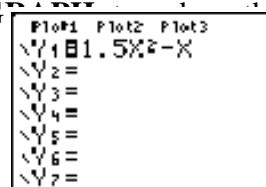
1. Press **MENU** and **5** for the GRAPH screen or move over and highlight the GRAPH icon and press **EXE**.
2. Enter the function in the Y= editor. (Press **EXE** to finish your entry and store the function.)
3. Press **SHIFT F3** to see the WINDOW and enter appropriate values for Xmin and Xmax. In this problem we are interested in the graph from 0 to 8. So we can see more of the graph than absolutely needed, we set Xmin to -2 and Xmax to 10.
4. Press **EXE** with each entry, when you are done entering values. The last **EXE** pressed returns to the Y= screen. Press **F6** (draw) to see the function.
5. Once the graph is drawn, press **SHIFT F2** then **F5** for Auto Zoom and it will find appropriate Y-values for your window and redraw the graph.
6. We will need room at the bottom of the screen for the calculator to display its directions. Press **SHIFT F3** to get back to the window and change Ymin to -16. Then press **EXE** to return to the Y= Editor and **F6** to redraw the graph.



TI GRAPHING CALCULATORS

Graphing $f(x) = 1.5x^2 - x$:

1. Press **Y=** and enter the function in the Y= editor. You must use the **X,T,θ,n** to enter the function variable as x instead of t .
2. Press **WINDOW** and enter appropriate values for Xmin and Xmax. In this problem we are interested in the graph from 0 to 8. So we can see more of the graph than absolutely needed, we set Xmin to -2 and Xmax to 10.
3. Press **ZOOM up arrow ENTER** to get the calculator to figure out appropriate y-values and to graph the function.
4. We will need some room at the bottom of the screen for the calculator to display its directions. Press **WINDOW** and change Ymin to -16. Then press **GRAPH** graph.



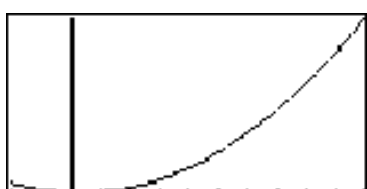
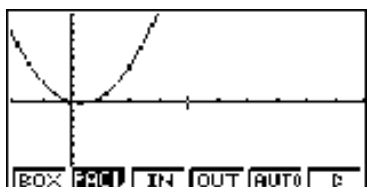
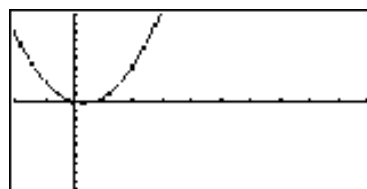
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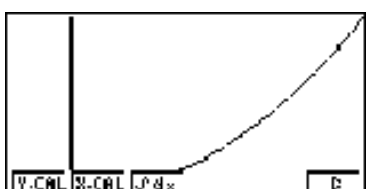
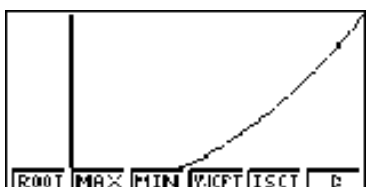


Finding the Area Under the Curve Graphically:

1. Press **SHIFT F5** (G-Solv) then **F6**, then **F3** to select the $\int dx$ option.
2. Using the arrow keys to move the tracer to the lower limit and then press **EXE**.

User note: You will then see the prompt on the screen telling you that you are now finding the UPPER limit.

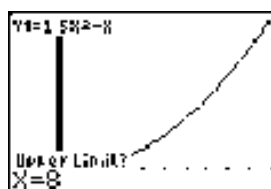
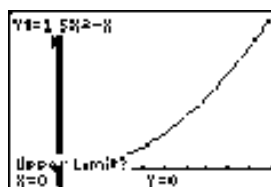
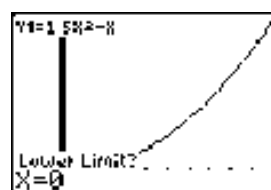
3. Using the arrow keys to move the tracer to the upper limit and then press **EXE** to display the value of the definite integral and to shade the area under the curve.



TI GRAPHING CALCULATORS

Finding the Area Under the Curve Graphically:

1. Press **2nd CALC 7** to select the $\int(x)dx$ option from the GRAPH/CALC menu.
2. Key in the lower limit and then press **ENTER**.
3. Key in the upper limit and then press **ENTER** to display the value of the definite integral and to shade the area under the curve.



Numerical Integration & Area Under a Curve

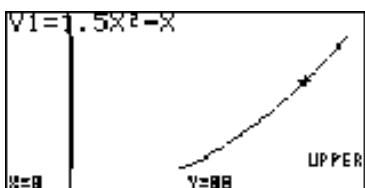
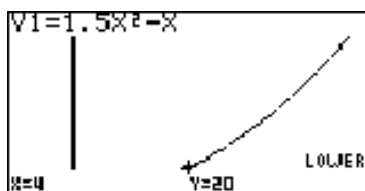
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User Note: In this set up, both the upper and lower bounds were easy to find using the trace cursor.

If the cursor arrows do not bring you to the exact limits you want to calculate for, you can still do both the calculation and display it on the graph by working from the RUN screen.

Finding the Area under the Graph Analytically and Displaying Graphically.

User Note: set a reasonable graph window before using this option.

1. Press **Menu** then **1** to get to the RUN (or home) screen.
2. Press **SHIFT F4** then **F5**(GRPH) then **F5** again to get to the $G \int dx$ option.
3. Enter the function (using x as the variable), lower limit, upper limit.
4. Press **EXE** and graph will be displayed along with the area under the curve.

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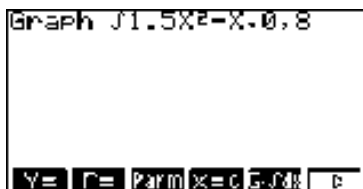
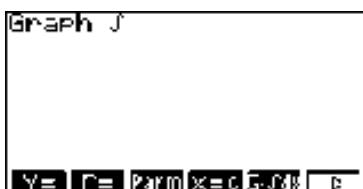
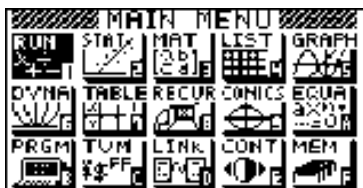
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THE CASIO ADVANTAGE

- Ease of use
- The method of finding of lower and upper bounds