

**Solids of Revolution
for TI-83/84 [Plus]
by Ira Hanson**

This program was written to automate the calculation of the volume of a [solid of revolution](#). A solid of revolution is a three-dimensional shape formed by rotating a two-dimensional area around an axis.

Normally, the process involves deciding the type of calculation to use (disk, washer, or shell), setting up an integral, and solving that integral. My program will do all of these steps automatically, so all the user needs to do is to enter the functions describing the axis and the area to be rotated.

Instructions

As an example, I'll use the solid of revolution formed by rotating the region bound by the functions $f(x) = 4x^2$ and $g(x) = 6 - 2x$ around the x-axis.

1. Start the program from the home screen by pressing **[PRGM]** and selecting SOLID, and then pressing **[ENTER]** to run **prgmSOLID** from the home screen.
2. Select the type of function for the boundaries of the area to be rotated. In this example, the equations are in the form $f(x)$.
3. Enter the two equations at the prompts, in any order.
4. The limits are the minimum and maximum values of the independent variable of the curve equations entered above. In the example, there are no limits specified, so the limits are $x = -1.5$ and $x = 1$, the x-values of the intersections of the two functions at $(-1.5, 3)$ and $(1, 4)$. These numbers can be entered in any order.
5. Select whether the axis of rotation is horizontal or vertical. In the example, the x-axis is horizontal.
6. Enter the equation of the axis—in our example, $y = 0$.
7. The calculator will give you the volume in two forms, as shown in the screenshot to the right. The number which is multiplied by π is stored in the variable **Ans**.
8. If you want to find the number as a fraction of π , press **[MATH][ENTER][ENTER]** after running the program to calculate **Ans**►**Frac**, which in this example gives $250/3$, meaning that the answer can be written as $250\pi/3$.

```
Curve equations:
f(X)=4X^2
g(X)=6-2X
Limits:
X=-1.5
X=1
```

```
Volume
=π*83.33333333
=261.7993878
```

Other Information

This program cannot calculate the volume if the area to be rotated intersects the axis of rotation.

Sometimes, the calculation will not be totally accurate, and the calculator will not be able to calculate a fraction, as in step 8. This is due to a limit of the accuracy of the calculator's `fnInt` function. If this happens, you may be able to guess the intended decimal value and enter the guess in place of `Ans`. It will also probably be close enough that you can do the calculation without my program, and then check your answer with the program.

If you have any questions, comments, bug reports, you can e-mail me at hanson.ira@gmail.com.