

Chapter 11 / Example 17

Volume of revolution

Let $f(x) = \frac{2x+4}{x+1}$, $0 \leq x \leq 4$. Find the volume of revolution formed when the curve $f(x)$ is rotated through 2π radians about
a the x -axis **b** the y -axis.

Press **MENU** 5 **GRAPH** to display the equation entry screen.

Type $\frac{2x+4}{x+1}$ and press **EXE** to enter the equation as Y1.

Graph Func : Y=
Y1: $\frac{2x+4}{x+1}$ [—]
Y2: [—]
Y3: [—]
Y4: [—]
Y5: [—]
[SELECT] [DELETE] [TYPE] [TOOL] [MODIFY] [DRAW]

Press **SHIFT** **F3** V-WIN.

Set the axes to show $-1 \leq x \leq 5$ and $-1 \leq y \leq 5$. You can leave the other items as they are.

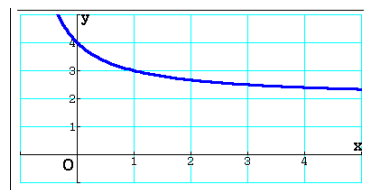
Press **EXIT** when you have finished.

View Window
Xmin : -1
max : 5
scale: 1
dot : 0.01587301
Ymin : -1
max : 5
[INITIAL] [TRIG] [STANDARD] [V-MEM] [SQUARE]

Press **F6** DRAW to display the graph screen

The GDC displays the graph $f(x) = \frac{2x+4}{x+1}$.

$$V = \int_0^4 \pi \left(\frac{2x+4}{x+1} \right)^2 dx$$



Press **MENU** 1 **RUN-MAT** to display the Run-Matrix screen for arithmetical calculations.

Press **F4** MATH **F6** \int **F1** $\int dx$

You will see an integral template. There are three fields to complete in the template: one for each of the limits and one for the function you are integrating.

$\int_{\square}^{\square} \square dx$
 $\int dx$ Σ \triangleright

Enter the function $\pi \left(\frac{2x+4}{x+1} \right)^2$

Enter the lower limit 0 and using the upper limit 4.

Press **EXE**.

$$V = \int_0^4 \pi \left(\frac{2x+4}{x+1} \right)^2 dx = 101.$$

$\int_0^4 \pi \left(\frac{2x+4}{x+1} \right)^2 dx$
100.7681655
 $\int dx$ Σ \triangleright

Chapter 11 / Example 17

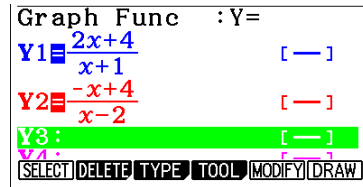
Volume of revolution

$$y = \frac{2x+4}{x+1} \Rightarrow x = \frac{-y+4}{y-2}$$

Express this function as $Y2 = \frac{-x+4}{x-2}$

Press **MENU** 5 **GRAPH** to return to the equation entry screen.

Type $\frac{-x+4}{x-2}$ and press **EXE** to enter the equation as Y2.

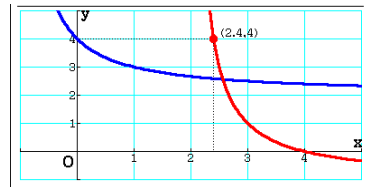


Press **F6** **DRAW** to display the graph screen

The GDC displays the graph $Y2 = \frac{-x+4}{x-2}$.

$x = 0 \Rightarrow y = 4$ and $x = 4 \Rightarrow y = 2.4$ so

$$V = \int_{2.4}^4 \pi \left(\frac{-x+4}{x-2} \right)^2 dx$$



Press **MENU** 1 **RUN-MAT** to display the Run-Matrix screen for arithmetical calculations.

Press **F4** **MATH** **F6** **▷** **F1** $\int dx$

Enter the function $\pi \left(\frac{-x+4}{x-2} \right)^2$

Enter the lower limit 2.4 and using the upper limit 4.

Press **EXE** **◻**

$$V = \int_{2.4}^4 \pi \left(\frac{-x+4}{x-2} \right)^2 dx = 9.93$$

