

Chapter 4 / Example 7

Reciprocal functions

Chas and Dev are planning to print their sports team logo on baseball caps, and sell the caps. They have to hire a printing machine, which costs \$500, and it will cost them an additional \$5 for every cap to be bought and printed.

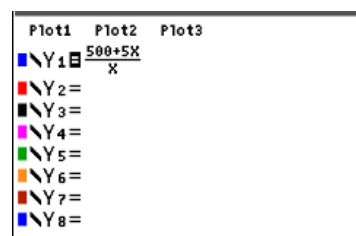
- Develop a model which links the number of caps they produce with average cost, per cap, they incur.
- Use your GDC to determine how many caps must be printed and sold if they are to sell the caps at \$7 per cap and just break even.

Let the number of caps produced be x , and the average cost incurred, per cap, be y , then $y = \frac{500 + 5x}{x}$

Press $[f1]$ $[y=]$ to display the equation entry screen.

Press $[ALPHA]$ $[f1]$ 1:n/d to select the fraction template.

Type $\frac{500 + 5x}{x}$ and press $[enter]$ to enter the equation as Y_1 .



With the default axes, nothing will be displayed.

The y -axis will need to go from 1 to at least 7. You can investigate what values are needed for the x -axis by trying numbers for X_{max} .

Press $[f2]$ $[window]$ and set the axes so that $0 \leq x \leq 200$ and $0 \leq y \leq 10$ with scales of 10 and 1.

You can leave the last three items as they are.

Press $[f5]$ $[graph]$ when you have finished.

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WINDOW
Xmin=0
Xmax=200
Xscl=10
Ymin=0
Ymax=10
Yscl=1
Xres=1
ΔX=.75757575757576
TraceStep=1.5151515151515

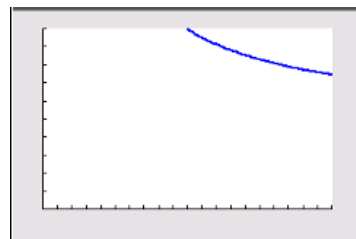
```

Press $[f5]$ $[graph]$ to display the graph screen

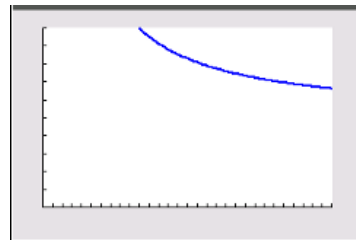
Clearly, if you need to see $y = 7$ then you will need a larger value of x than 200.

Press $[f2]$ $[window]$ and change X_{max} to 300 and press $[enter]$.

Press $[f5]$ $[graph]$.



The GDC now displays $y = \frac{500 + 5x}{x}$ in a suitable window.



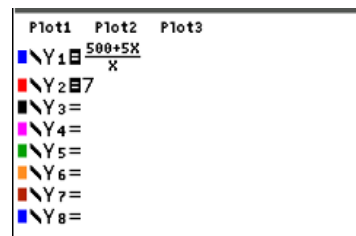
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Reciprocal functions

You now need to Plot the line $y = 7$ on the same axes and find the intersection point.

Press $[F1]$ $[Y=]$ to return to the equation entry screen.

Type 7 press $[ENTER]$ to enter the equation as Y_2 .

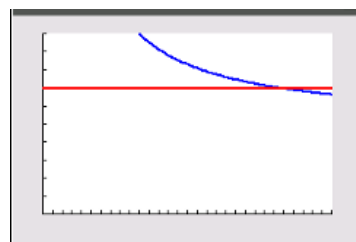


Press $[F5]$ $[GRAPH]$. The GDC now displays both graphs:

$$Y_1 = \frac{500 + 5x}{x}$$

$$Y_2 = 7$$

with suitable axes.

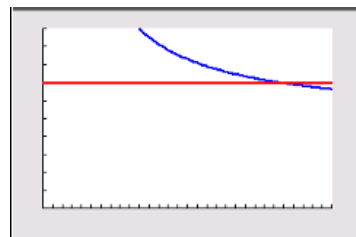


Press $[2ND]$ $[F4]$ $[CALC]$ 5:intersect

To find the intersection you need to choose the two lines that intersect.

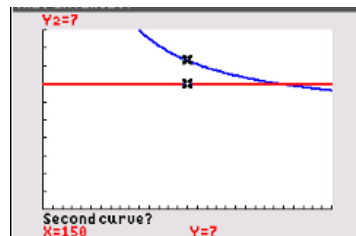
The GDC shows a cross on one of the lines and 'First curve?'.

Press $[ENTER]$.



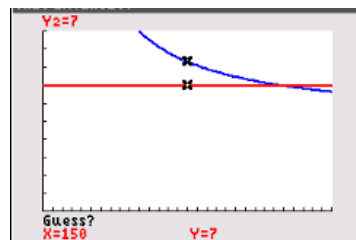
The GDC shows a cross on the other line and 'Second curve?'.

Press $[ENTER]$.



The GDC requires an initial guess for the position of the intersection. Choose the default position.

Press $[ENTER]$.



The GDC displays the intersection of the two straight lines at the point (250, 7)

Chas and Dev must produce 250 caps to break even.

