

Chapter 7 / **Example 5**

Sum of a geometric sequence

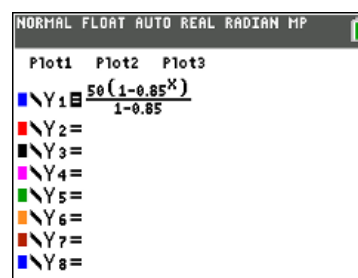
The students in a school decided to raise money in order to install hammocks in the campus. They have 10 days to raise the required money of €300. The money raised on the first day was €50. The money that they raise on each subsequent day is 15% less than the previous.

- Calculate the amount of money they expect to raise in total. Comment on whether this will be enough to purchase the hammocks.
- Calculate the number of full days they would need to fundraise on if they are to raise enough money to purchase the hammocks.
- Find the maximum daily percentage decrease in the money they raise if they are to reach their goal of raising €300 in 10 days.

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

Enter $\frac{50(1-0.85^X)}{1-0.85}$ in Y_1 .

Use the fraction template [ALPHA] [F1] 1:n/d



Press [2nd] [F5] ([TABLE]).

From the table, $S_{10} = \frac{50(1-0.85^{10})}{1-0.85} = 267.71$

The calculator screen shows the table of values for Y1. The table has two columns: X and Y1. The values for X range from 0 to 10, and the values for Y1 are calculated using the formula Y1 = 50(1-0.85^X)/(1-0.85). The total sum S10 is displayed at the bottom as Y1=267.708531886.

X	Y1
0	0
1	50
2	92.5
3	128.63
4	159.33
5	185.43
6	207.62
7	226.47
8	242.5
9	256.13
10	267.71

Y1=267.708531886

Scroll down the table using [▼].

$S_{15} = \frac{50(1-0.85^{15})}{1-0.85} = 304.22$

They would need at least 15 days in order to collect €300.

The calculator screen shows the table of values for Y1, scrolled down to X=15. The table has two columns: X and Y1. The values for X range from 6 to 16, and the values for Y1 are calculated using the formula Y1 = 50(1-0.85^X)/(1-0.85). The total sum S15 is displayed at the bottom as Y1=304.2152603.

X	Y1
6	207.62
7	226.47
8	242.5
9	256.13
10	267.71
11	277.55
12	285.92
13	293.03
14	299.08
15	304.22
16	308.58

Y1=304.2152603

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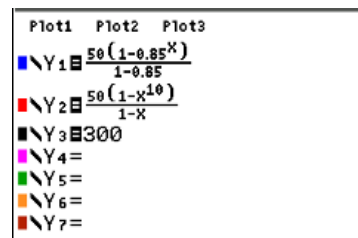
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Press [F1] [Y=] to display the equation entry screen.

Type $\frac{50(1-X^{10})}{1-X}$ using the fraction template

[ALPHA] [F1] 1:n/d in the second equation as Y_2 .

Type 300 in the third equation Y_3 .

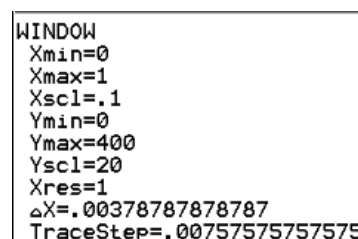


Press [F2] [WINDOW]

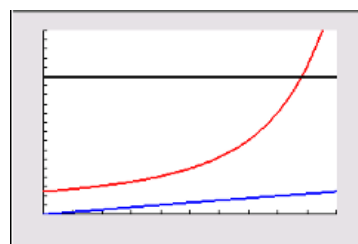
Change the settings to $0 \leq x \leq 1$ with a scale of 0.1 and
 $0 \leq y \leq 400$ with a scale of 20.

Leave everything else the same.

Press [F5] [GRAPH] when you have finished.



The GDC displays the graphs in a suitable window.

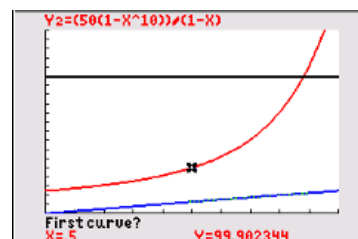


Press [2nd] [F4] [CALC] 5:intersect

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

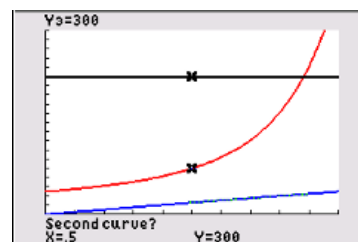
The GDC shows a cross on the curve and 'First curve?'.

Select Y_2 and press [ENTER].



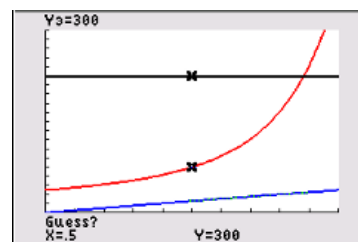
The GDC shows a cross on the line and 'Second curve?'.

Select Y_3 and press [ENTER].



The GDC requires an initial guess for the position of the intersection. Choose a point close to the first intersection by moving the cursor with the [◀] [▶] keys.

Press [ENTER].



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The GDC displays an intersection at $(0.879, 300)$.

$$r = 0.879 \Rightarrow p = 12.1\%$$

