

Chapter 13 / Example 5

Modelling Change

Using functions can be an efficient way to make calculations with the GDC.

A company uses the function $C(x) = 100 + x - 0.01x^2 + 0.00006x^3$ to estimate the cost, in Euros, of producing x items. The revenue, in Euros, of selling x items is modelled by $R(x) = 22.8x - 0.001x^2$.

- Find the cost of producing 300 items.
- Find the marginal cost of producing 300 items and explain what this means, in context.
- Find the marginal profit of selling 300 items and explain what this means, in context.

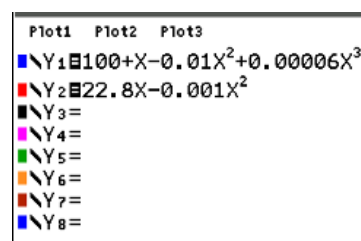
You are first going to define the functions $C(x)$, $R(x)$ and a profit function $P(x)$ using the built-in functions Y_1 , Y_2 and Y_3 .

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

Type $100 + x - 0.01x^2 + 0.00006x^3$ and press $[enter]$ to enter $C(x)$ as Y_1 .

Type $22.8x - 0.001x^2$ and press $[enter]$ to enter $R(x)$ as Y_2

To enter 3 , press $[x^y]$ $[3]$.



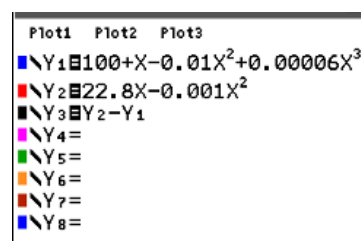
To enter $P(x) = R(x) - C(x)$ in Y_3

Press $[alpha]$ $[f4]$ $2:Y_2$

Type $[-]$

Press $[alpha]$ $[f4]$ $1:Y_1$

Press $[enter]$



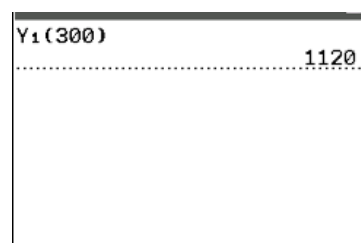
Press $[2nd]$ $[quit]$

Find $C(300)$

Press $[alpha]$ $[f4]$ $1:Y_1$

Type (300) and press $[enter]$

The cost of producing 300 items is €1,120



Chapter 13 / Example 5

Modelling Change

The marginal cost function is the derivative of the cost function. Use a GDC to find $C'(300)$.

Press α [f2] 3:nDeriv

The template has spaces for the variable, x , the function and the value that it is evaluated at.

Enter X in the denominator and the function Y_1 using α [f4] 1:Y₁

Type 300 and press enter .

$$Y_1(300) \quad 1120$$

$$\frac{d}{dX} () \big|_{X=}$$

The marginal cost of producing 300 items, $C'(300)$, is €11.20

$$Y_1(300) \quad 1120$$

$$\frac{d}{dX} (Y_1) \big|_{X=300} \quad 11.2$$

The marginal profit function is the derivative of the profit function. Use a GDC to find $P'(300)$.

Press α [f2] 3:nDeriv

Enter X in the denominator and the function Y_3 using α [f4] 1:Y₃

Type 300 and press enter .

The marginal cost of selling 300 items, $P'(300)$, is €11.

$$Y_1(300) \quad 1120$$

$$\frac{d}{dX} (Y_1) \big|_{X=300} \quad 11.2$$

$$\frac{d}{dX} (Y_3) \big|_{X=300} \quad 11$$