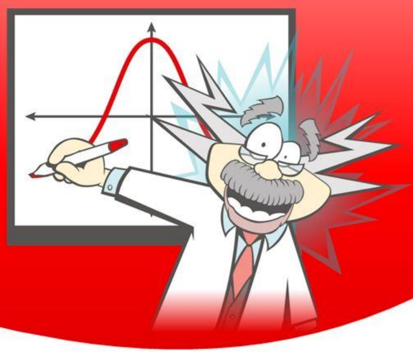
STUDENT REVISION SERIES



First Principles - Derivatives

Each of the questions included here can be solved using either the TI-nspire CX or CX CAS.

Scan the QR code or use the link: bit.ly/FirstPrinciplesDerivative

Question: 1.

Determine the gradient of the secant connecting $x = 2$ and $x = 3$ on the function: $f(x) = x^2 + 3$ and compare the result to that obtained in the video for the same x values.

Question: 2.

Use first principles to calculate the approximate gradient to the function: $f(x) = x^3$ at the point $x = 4$ for $h = 0.1$

Question: 3.

Use first principles to calculate the gradient of the function $f(x) = (x-3)^2$ at the point $x = 2$ for $h = 0.1$

Question: 4.

Use first principles to calculate the gradient of the function $f(x) = x^2 - 6x$ at the point $x = 2$ for $h = 0.1$ and compare with the answer with that obtained for Question 3.

Question: 5.

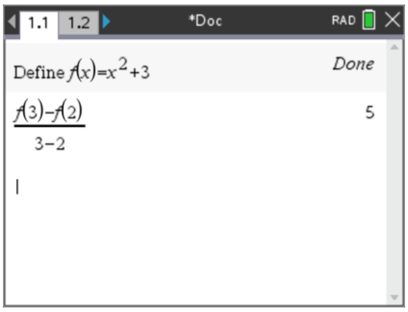
Use first principles to determine the gradient of the function $f(x) = x^3$.

Author: Peter Fox

Answers

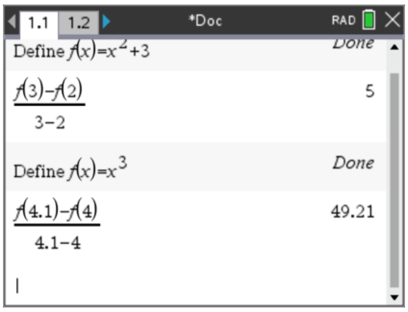
Question 1

Since $f(3)=12$ and $f(2)=7$ then the gradient of the secant is 5.



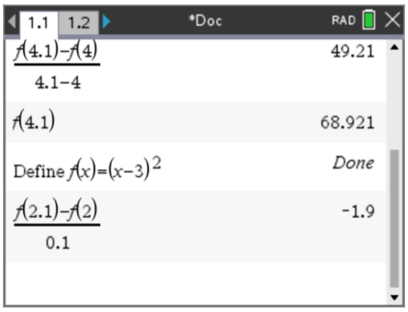
Question 2

Since $f(4)=64$ and $f(4)=68.921$ then the gradient of the secant will be: 4.921 ÷ 0.1 = 49.21.



Question 3

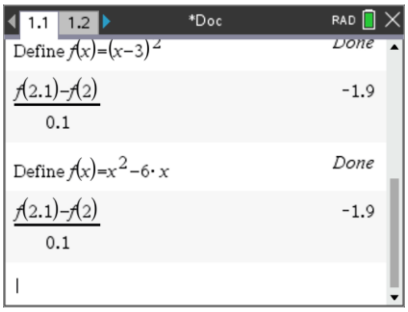
Since $f(2)=1$ and $f(2.1)=0.81$ the gradient of the secant is -1.9.



Question 4

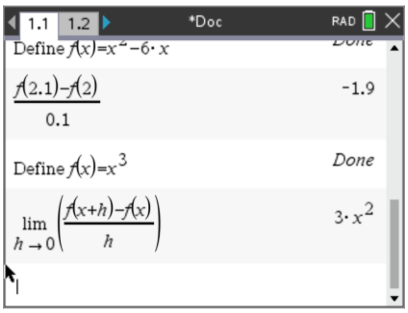
Since $f(2)=1$ and $f(2.1)=0.81$ the gradient of the secant is -1.9.

The answers are the same since $(x-3)^2 = x^2 - 6x + 9$ which is a simple 'vertical' translation of the function: $x^2 - 6x$, therefore it makes sense that the same x values would generate the same gradient.



Question 5

On the TI-nspire CX CAS series, it is possible to simply use the limit command.
TI-nspire CX requires the calculations be done by hand.



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