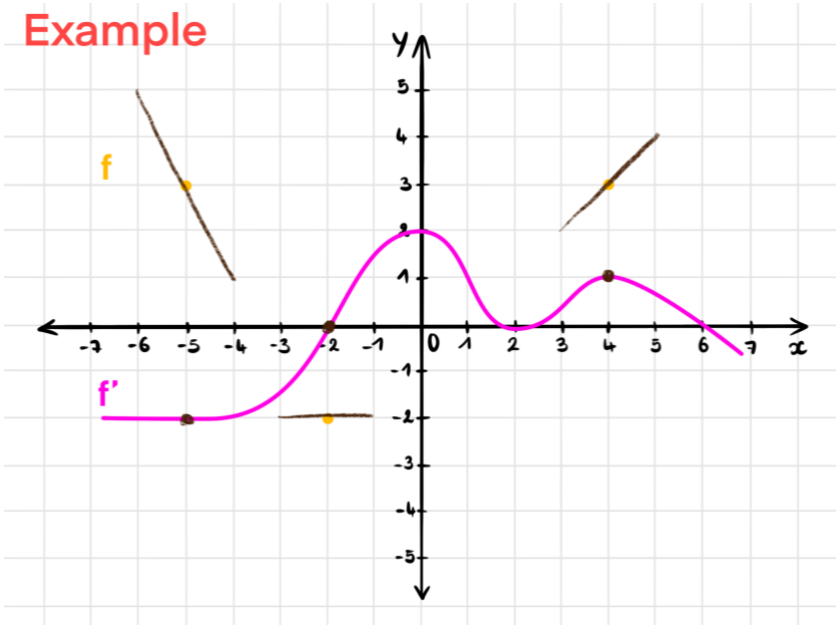
Questionnaire 2.4 (post)

Participant Id = _____

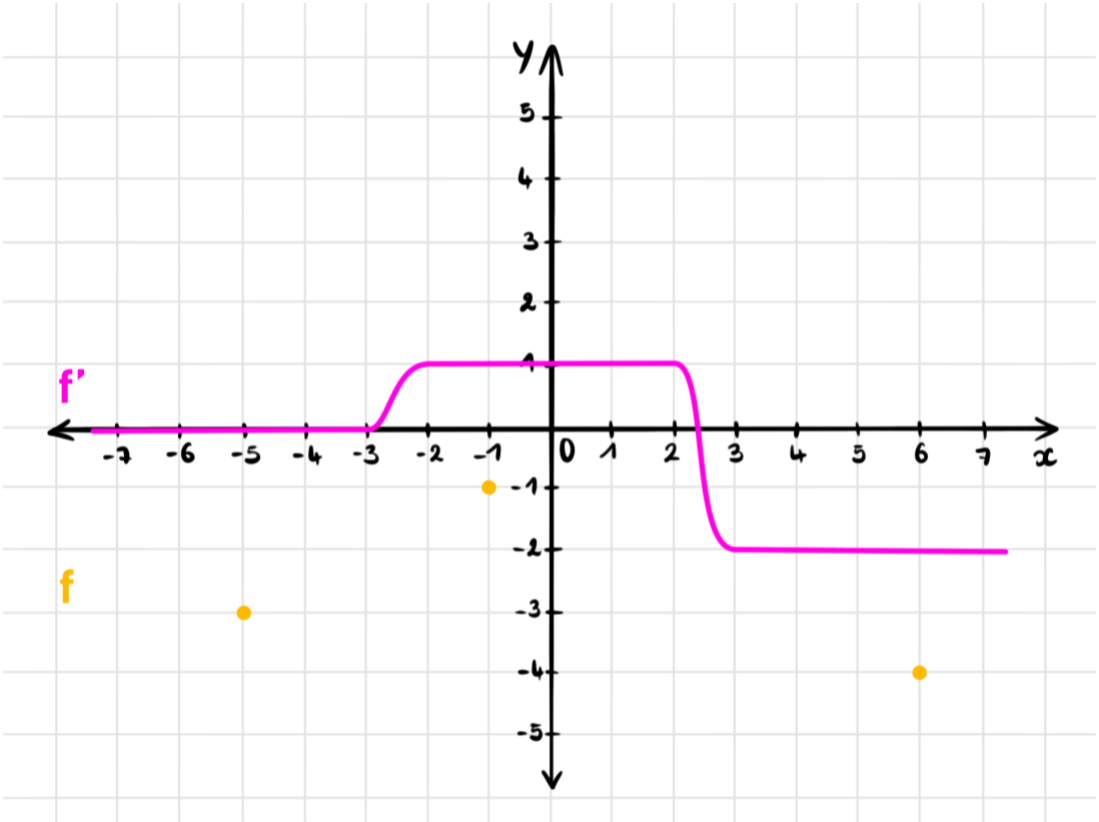
Please fill in the following questionnaire. This questionnaire is not part of your curriculum and will not influence your grade in any way.

Section 1.

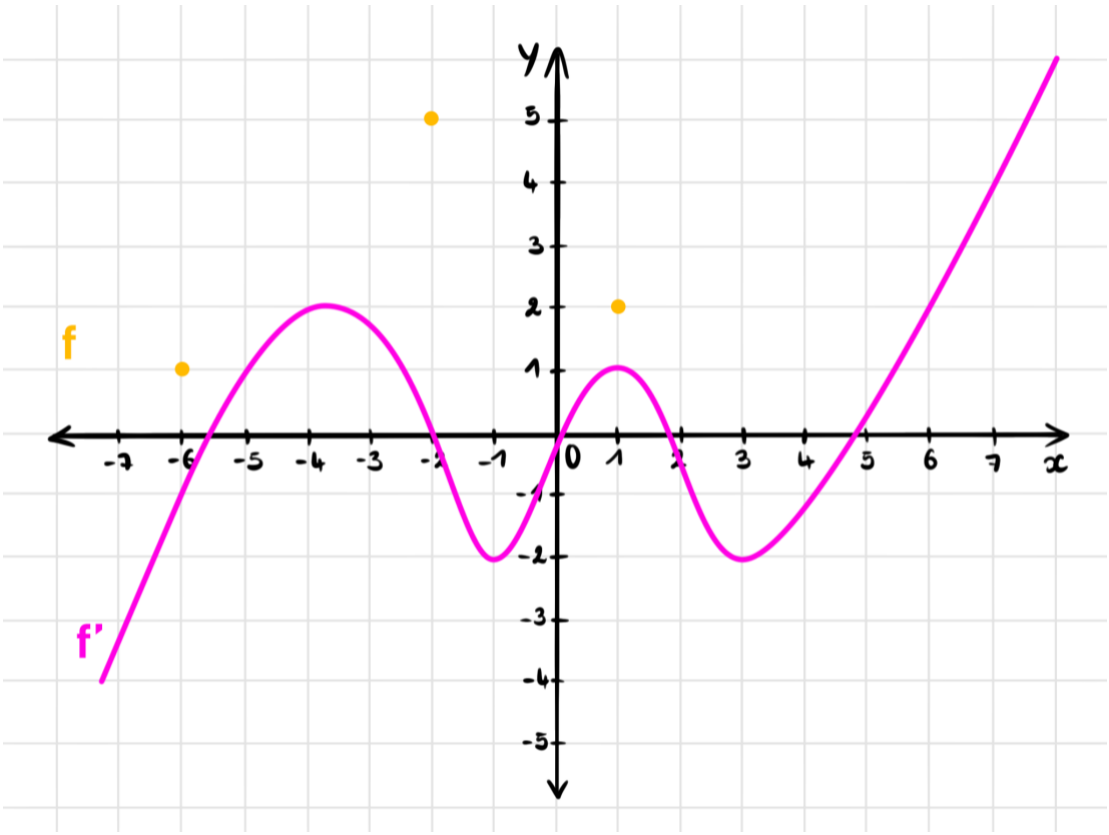
On the following graphs, the target **derivative f'** is represented in pink. Only a few points of the **function f** are visible. For each of these points, draw the desired tangent.



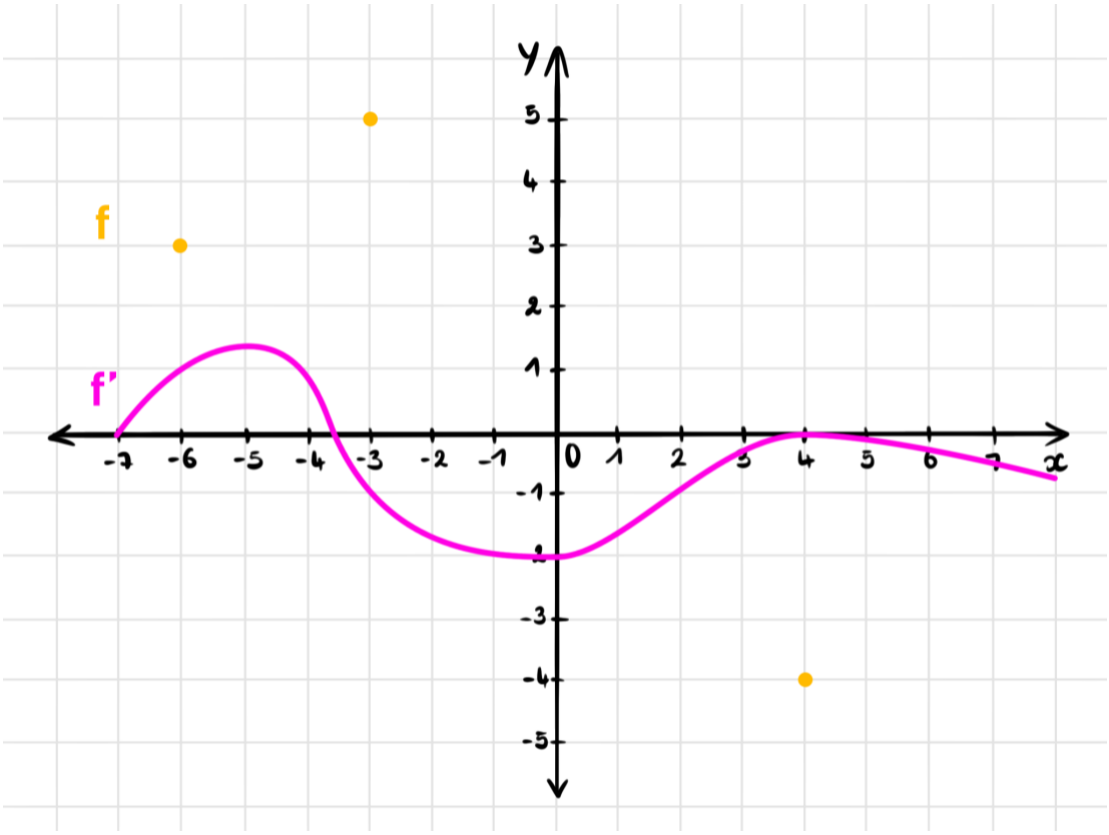
Task 1:



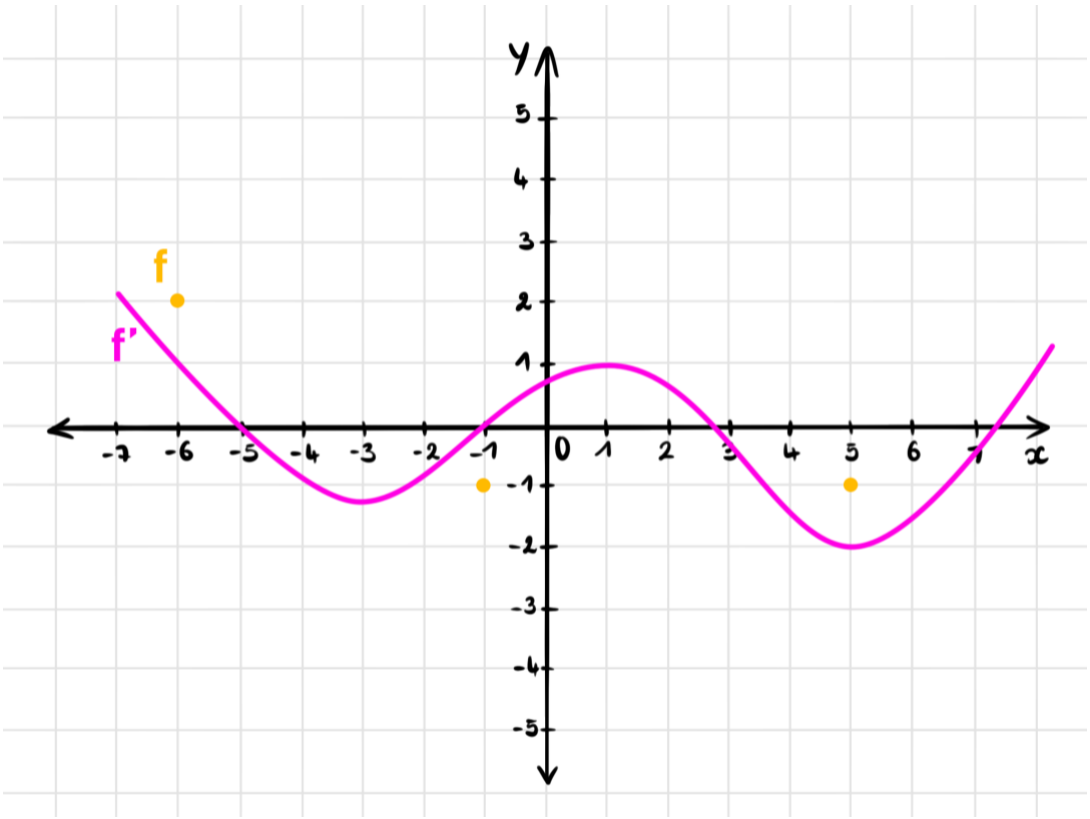
Task 2:



Task 3:



Task 4:



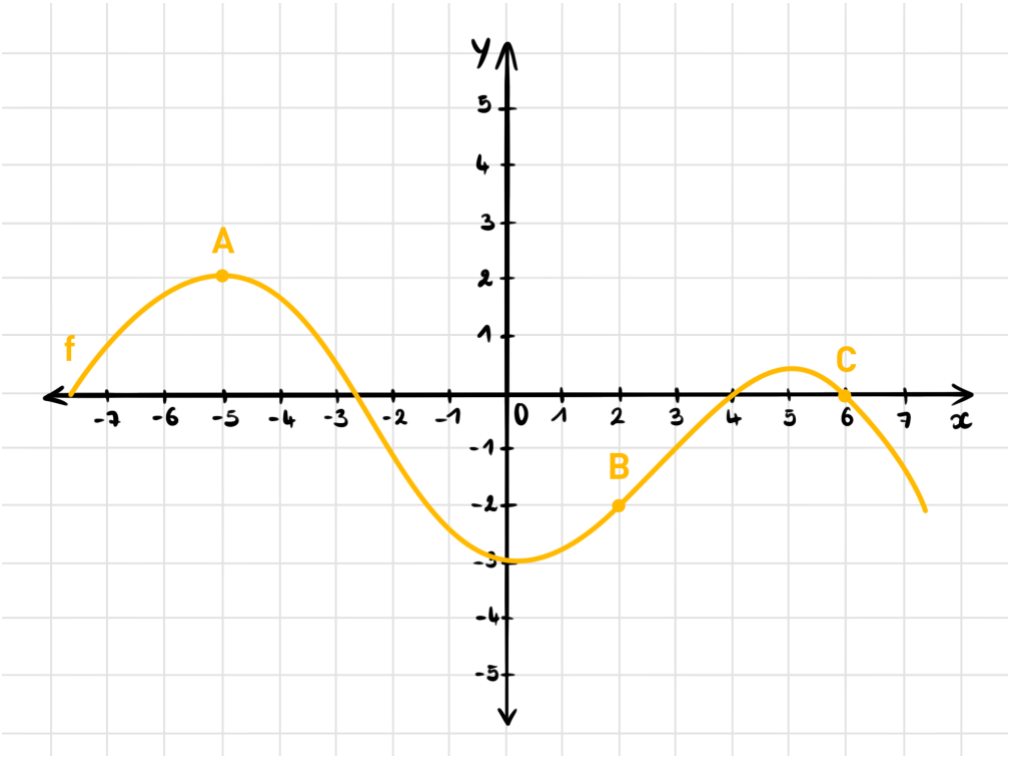
Questionnaire 2.5 (post)

Participant Id = _____

Please fill in the following questionnaire. This questionnaire is not part of your curriculum and will not influence your grade in any way.

Section 1.

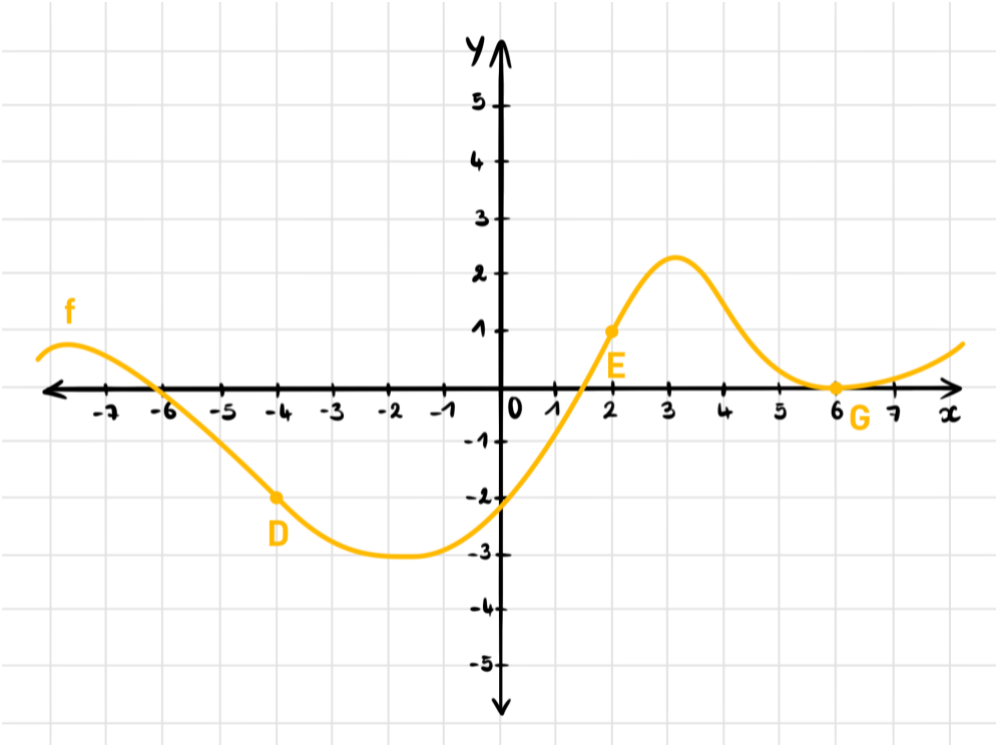
On the following graphs, the **function f** is represented in orange.



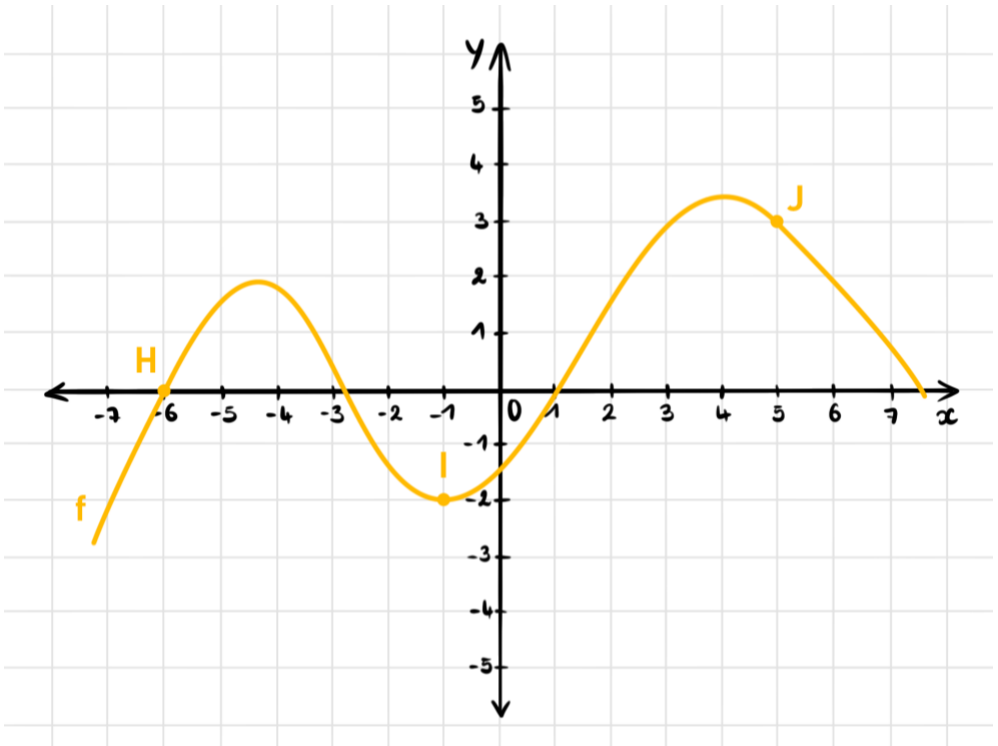
What is the value of the **derivative f'** at point A? f'(-5) = _____

What is the value of the **derivative f'** at point B? f'(2) = _____

What is the value of the **derivative f'** at point C? f'(6) = _____



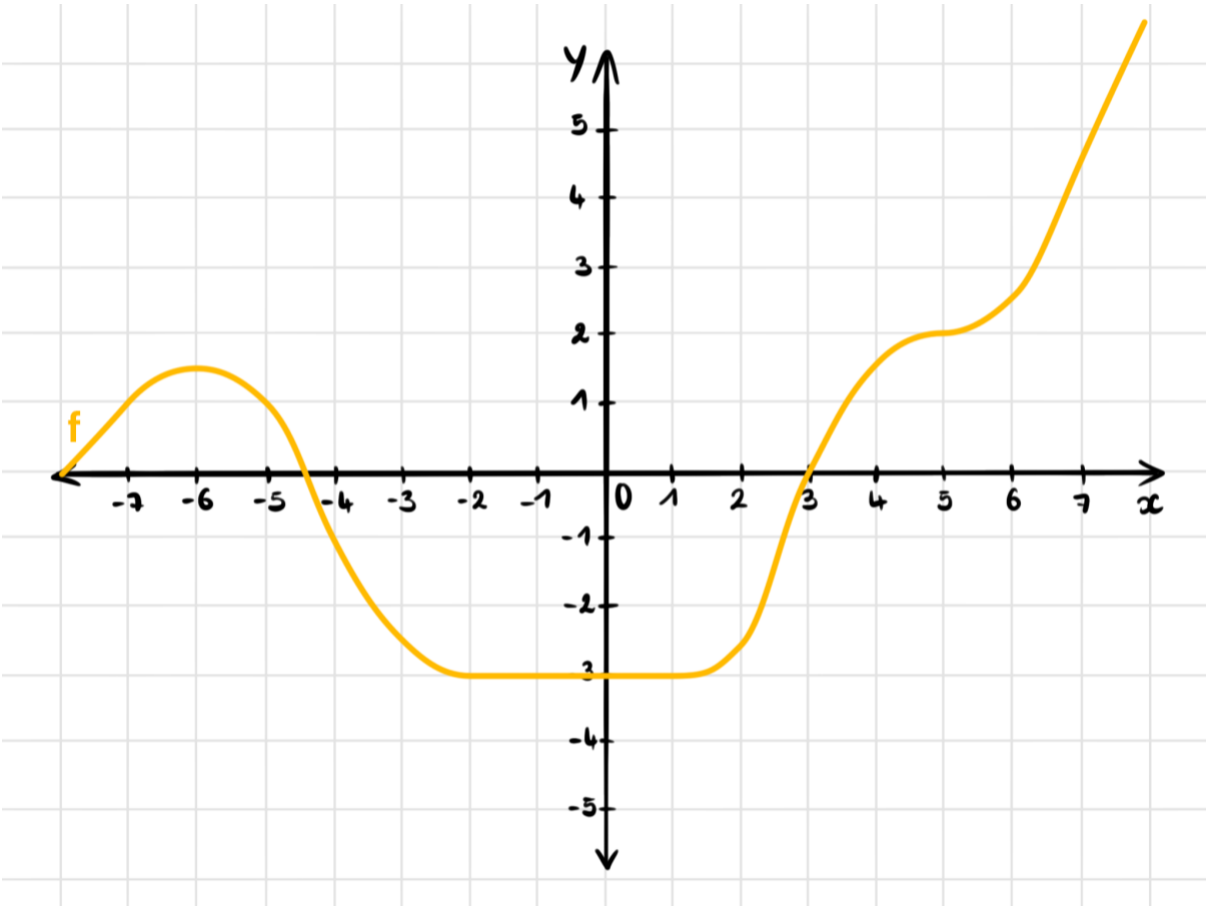
What is the value of the **derivative f'** at point D? f'(-4) = _____
What is the value of the **derivative f'** at point E? f'(2) = _____
What is the value of the **derivative f'** at point G? f'(6) = _____



What is the value of the **derivative f'** at point H? f'(-6) = _____
What is the value of the **derivative f'** at point I? f'(-1) = _____
What is the value of the **derivative f'** at point J? f'(5) = _____

Section 2.

On the following graph, the **function f** is represented in orange. Draw the **derivative f'** of the function on the graph.



Section 3.

In this section, the left column shows the sign table of the **derivative f'**. A sign table shows the evolution of the sign of the derivative along the x axis. From example, $+0-$ means that the **derivative f'** is first positive over a certain interval, then crosses zero on one point, and becomes negative over an interval.

In each exercise, you have to look at the sign table of the **derivative f'** on the left, and draw a possible shape of the **function f** in the frame on the right.

Example:

derivative f'

$+ \quad 0 \quad -$ →

function f

derivative f'

$- \quad 0 \quad + \quad 0 \quad -$ →

function f

derivative f'

$+ \quad 0 \quad - \quad 0 \quad +$ →

function f

derivative f'

$+ \quad 0 \quad + \quad 0 \quad +$ →

function f

derivative f’

$- \quad 0 \quad - \quad 0 \quad -$ $\rightarrow$

function f

derivative f’

$+ \quad 0 \quad + \quad 0 \quad - \quad 0 \quad +$ $\rightarrow$

function f

derivative f’

$- \quad 0 \quad + \quad 0 \quad - \quad 0 \quad +$ $\rightarrow$

function f

derivative f’

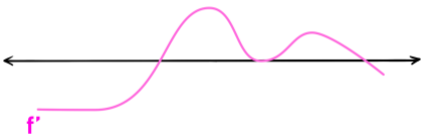
$+ \quad 0 \quad + \quad 0 \quad - \quad 0 \quad -$ $\rightarrow$

function f

Section 4.

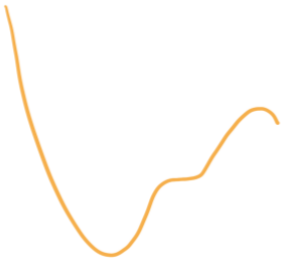
In this exercise, you have to look at the **derivative f'** on the left, and draw the shape of the **function f** in the frame on the right.

derivative f'

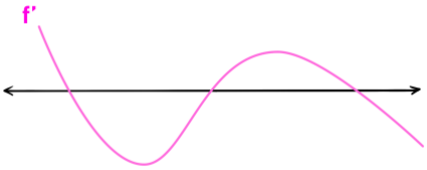


→

function f



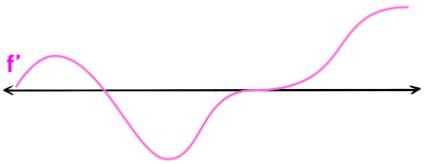
derivative f'



→

function f

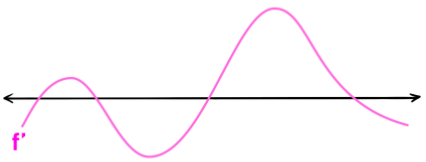
derivative f'



→

function f

derivative f'



→

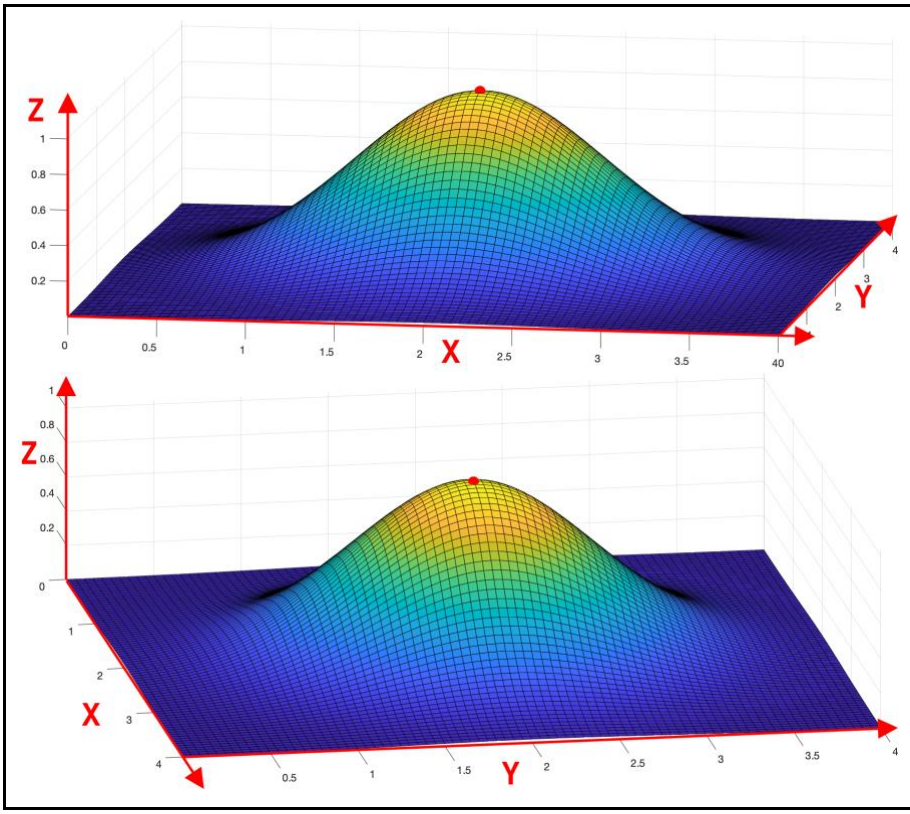
function f

Section 5.

In this section, all the exercises will be in 3D spaces. The **function** is represented on the left, from two different perspectives, and with a specific **point** indicated in red. On the right, you have to select the correct value of the **derivative** at this **point**.

In 3D, the **derivative** at a specific point has two components. The x component of the derivative vector represents the slope along the x axis: how much does the surface go up or down if we follow the x-axis in the direction of its arrow. Similarly, the y component represents the slope along the y axis.

Be mindful of the direction of the axes!

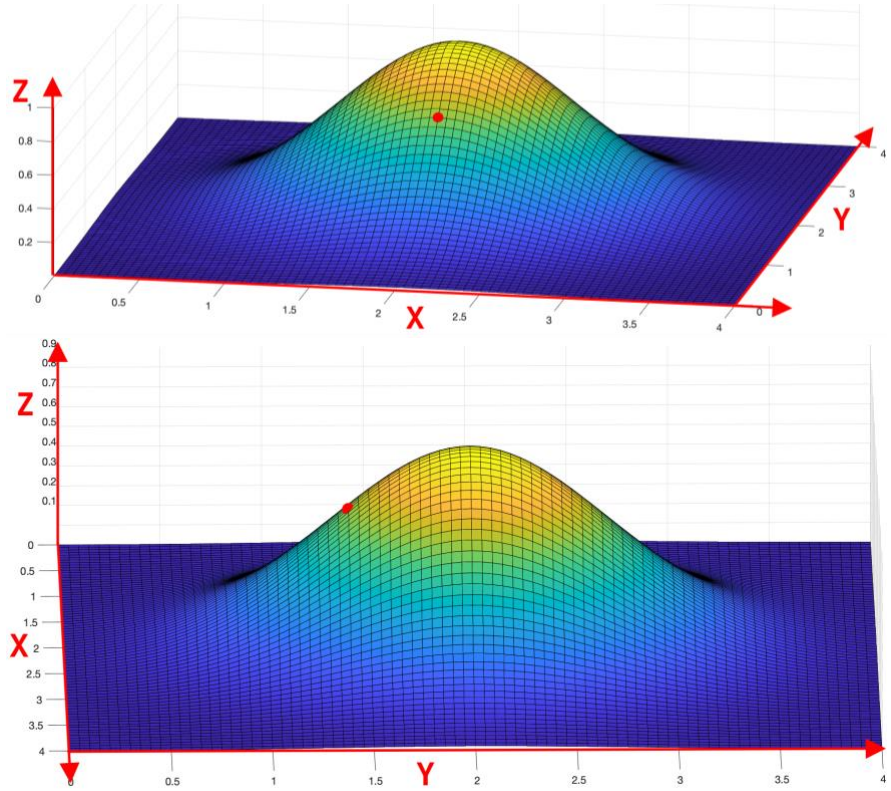


Derivative along x

- ◯ -1
- ◯ 0
- ◯ 1

Derivative along y

- ◯ -1
- ◯ 0
- ◯ 1

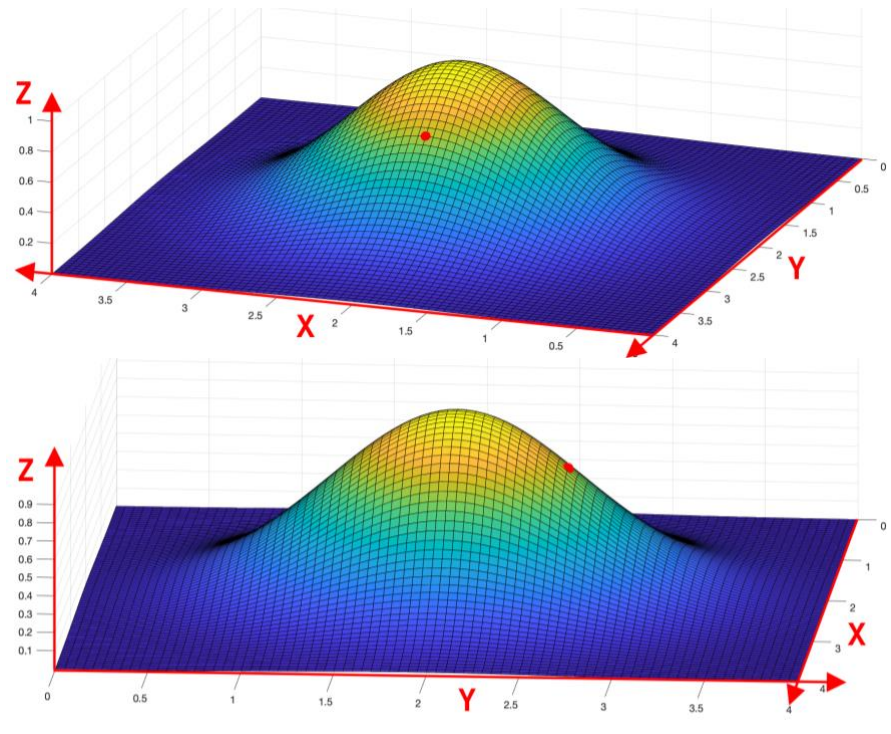


Derivative along x

- ◯ -0.8
- ◯ 0
- ◯ 0.8

Derivative along y

- ◯ -0.8
- ◯ 0
- ◯ 0.8



Derivative along x

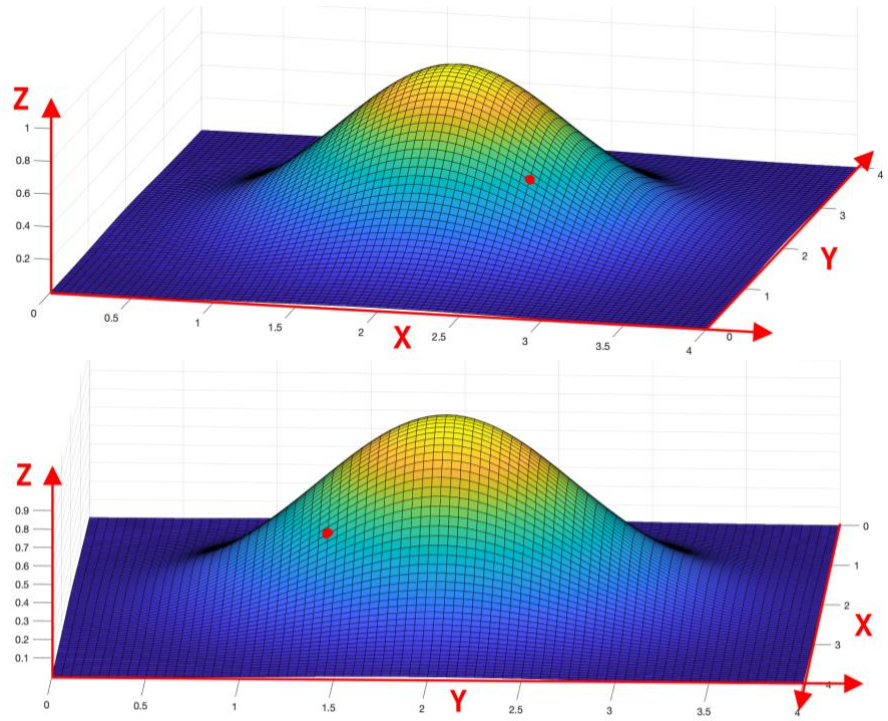
- ◯ -0.8
- ◯ 0
- ◯ 0.8

Reverted axis

Derivative along y

- ◯ -0.8
- ◯ 0
- ◯ 0.8

Derivative along x



◯ -0.6

◯ 0

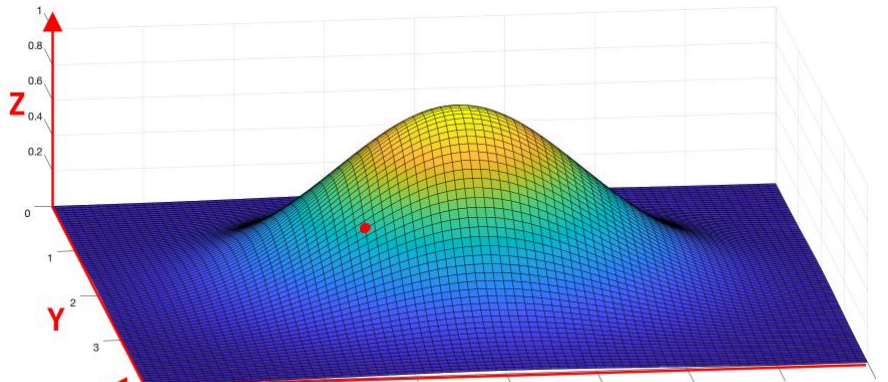
◯ 0.6

Derivative along y

◯ -0.6

◯ 0

◯ 0.6



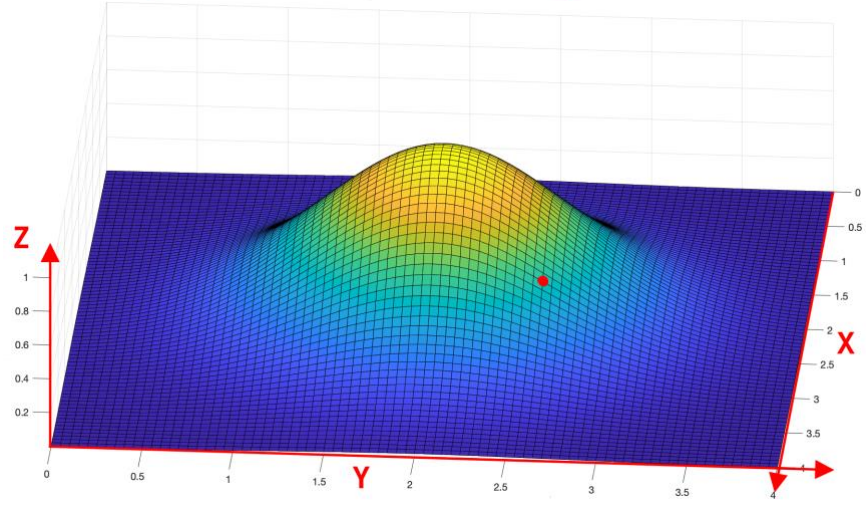
Derivative along x

◯ -0.6

◯ 0

◯ 0.6

Reverted axis

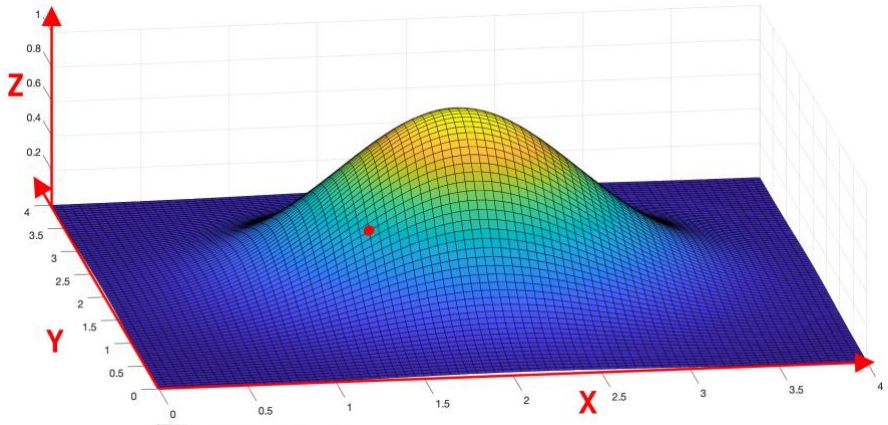


Derivative along y

◯ -0.6

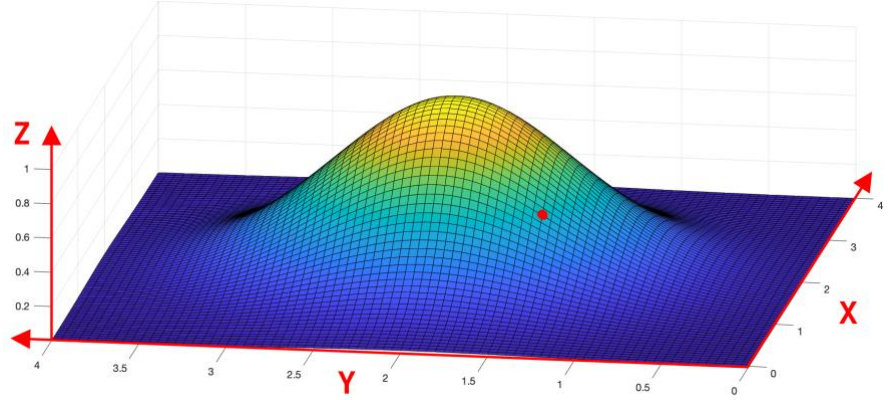
◯ 0

◯ 0.6



Derivative along x

- ◯ -0.6
- ◯ 0
- ◯ 0.6



Derivative along y

- ◯ -0.6
- ◯ 0
- ◯ 0.6

Reverted axis

Questionnaire 2.6 (post)

Participant Id = _____

Please fill in the following questionnaire. This questionnaire is not part of your curriculum and will not influence your grade in any way.

Section 1.

How would you explain what a **derivative** is to your friend who doesn't know?

Section 2.

What do you think the value of the **derivative** is at the maximum of a **function**? Please justify your answer.

Section 3.

Do you think that two different **functions** can have the same **derivative**? Please justify your answer.

Do you think that it is possible to trace the graph of a **function** from the graph of its **derivative**? Please justify your answer.

Section 4.

Have you ever learnt about a concept similar to the **derivative** in another course? If yes, which concept and which course?

Questionnaire 2.7 (post)

Not included due to copyright.

The questionnaire contained elements 2, 3, 7, 8, and 9 from the Calculus Concept Inventory.

Reference

Epstein, J. (2007, September). Development and validation of the Calculus Concept Inventory. In Proceedings of the ninth international conference on mathematics education in a global community (Vol. 9, pp. 165-170). Charlotte, NC.

Obtained from (October 2021):
https://www.physport.org/assessments/assessment.cfm?A=CCI