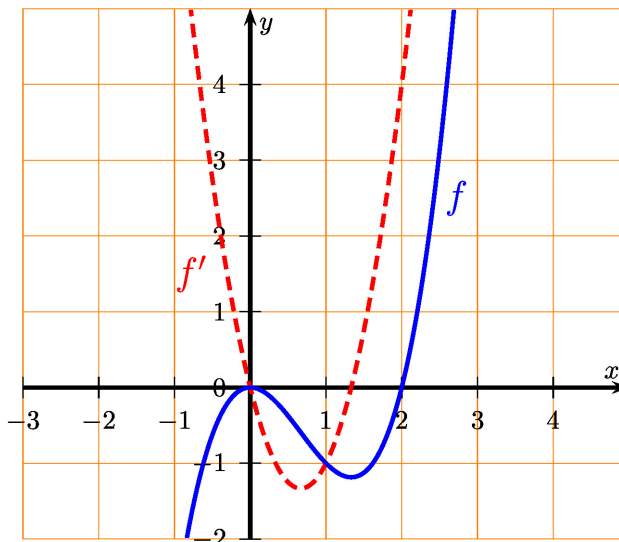


Exercise 1

Calc. : ✗

The diagram below shows the graph of a function f and that of its derivative function f' .

- a) **Find** the value of $f(2)$ and $f'(2)$.
- b) **Determine** an equation of the tangent to the graph of f at the point where $x = 2$.

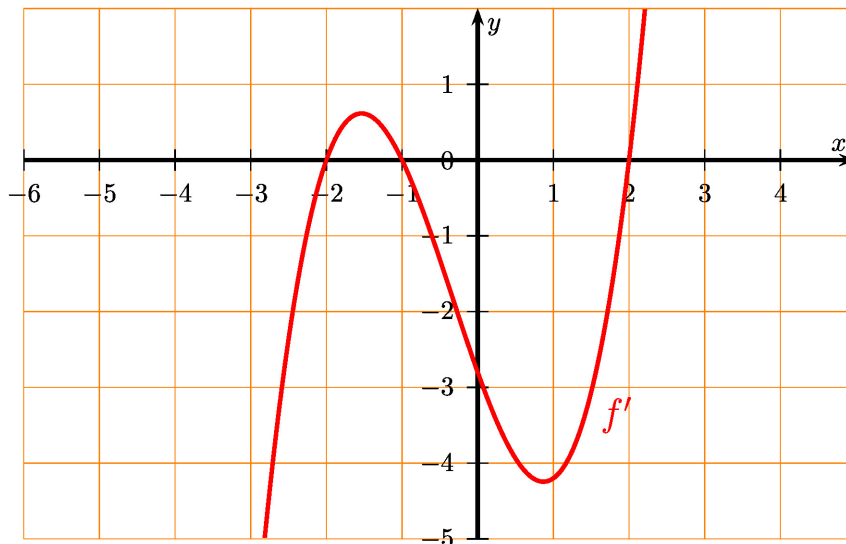


2 marks
3 marks

Exercise 2

Calc. : ✗

The diagram shows the graph of the derivative f' of a function f .



- a) **Give** the intervals on which the function f is increasing.
- b) **Determine** whether the function f has a local maximum. **Justify** your answer.

2 marks
3 marks

Exercise 3

Calc. : ✗

Consider the function f defined by $f(x) = 3x^3 - 2x^2 - 1$.
Consider also the function F defined by $F(x) = a \cdot x^4 + b \cdot x^3 + c \cdot x + d$, where a, b, c and d are four real numbers.

- a) **Find** the values of the three parameters a, b , and c such that $F' = f$.
- b) **Find** the value of the parameter d such that $F(1) = \frac{1}{12}$.

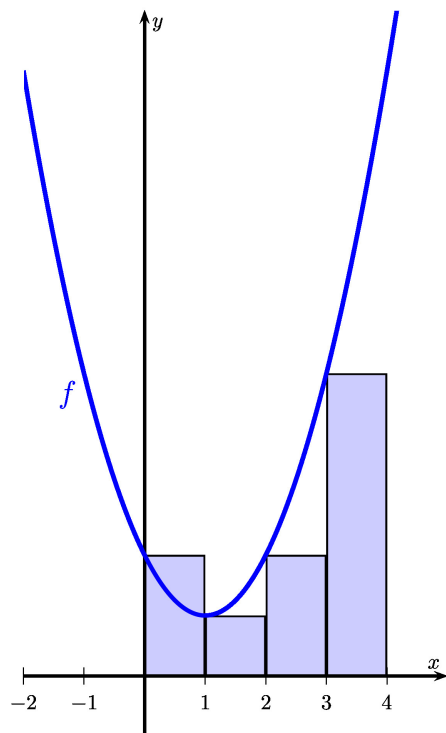
3 marks
2 marks

Exercise 4

Calc. : ✖

Here is the curve of the function f defined by:

$$f(x) = x^2 - 2x + 2$$



- a) **Find** an approximation of the area under the curve from $x = 0$ to $x = 4$ by using left sided rectangles of width 1. 3 marks
- b) Based on the graph, **discuss** if this approximation is an over-estimation of $\int_0^4 f(x) dx$, or an under-estimation. **Justify** your answer. 2 marks

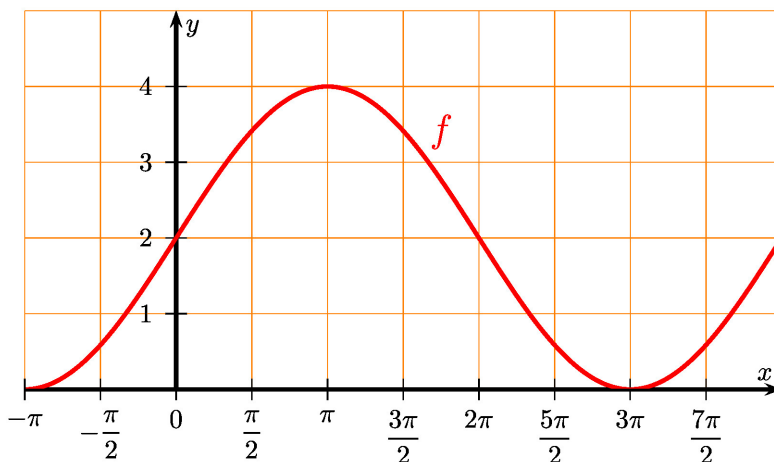
Exercise 5

Calc. : ✗

The graph below shows a periodic function f , defined by:

$$f(x) = a \cdot \sin(b(x - c)) + d$$

((where a , b , c and d are four real numbers).



Based on the information in the graph,

- **determine** the amplitude, the period and the vertical shift of f , then **give** the values of a , b and d .
- **find** $f(\pi)$ and $f(9\pi)$.

5 marks

Exercise 6

Calc. : ✗

Let us consider the function f defined by:

$$f(x) = \frac{1}{x}$$

We recall that the function F defined by $F(x) = \ln(x)$ is a primitive of f .

Calculate the area under the curve of f from $x = 1$ to $x = e$.

5 marks

Exercise 7

Calc. : ✗

Two brothers, Jarek and Kuba, wash the dishes after each dinner. Kuba is older and the probability that he washes the dishes after dinner is $4/7$.

When Kuba washes the dishes, the probability of breaking a plate is $2/100$. When Jarek washes the dishes, this probability is $1/100$.

We select a dinner at random.

- Draw** a tree diagram of the situation described.
- A plate is broken during the washing of the dishes after the selected dinner. **Calculate** the probability that Kuba washed the dishes.

2 marks

3 marks

Exercise 8

Calc. : ✗

In a certain class, 60% of the students have a cat, 50% of the students have a dog. We also know that 30% of the students have both a dog and a cat. We select a student at random in this class and we consider the following two events:

Event A — the student has a dog,

Event B — the student has a cat.

- Determine** if the events A and B are independent. **Justify** the answer.
- Calculate** $P(A \cup B)$.

2 marks

3 marks

Exercise 9

Calc. : ✖

A player throws at a dartboard 4 times in a row. For each throw, the player hits the bull's eye in the center of the dartboard with a probability of $1/4$. The random variable X indicates how often the player hits the bull's eye.

- a) **Explain** why the random variable X follows a binomial distribution and **give** its parameters. 2 marks
- b) **Calculate** the probability that the player hits the bull's eye exactly three times. 3 marks

Exercise 10

Calc. : ✖

The data presented in the table below describes the growth of a cactus. This type of plant can grow to be maximum 5 meters tall.

$x =$ Years after planted	0	1	2	3	4	5	6
$y =$ Height (m)	0	0.6	1.3	1.7	2.2	2.5	2.9

- a) **Draw** a scatterplot for this data. **Use** an appropriate scale. 2 marks
- b) Knowing that the data describes the growth of a cactus that can maximum become 5 meters high, **discuss** what kind of regression model would describe the data best. **Justify**. 3 marks