Exercise 1   Calc. : ✗
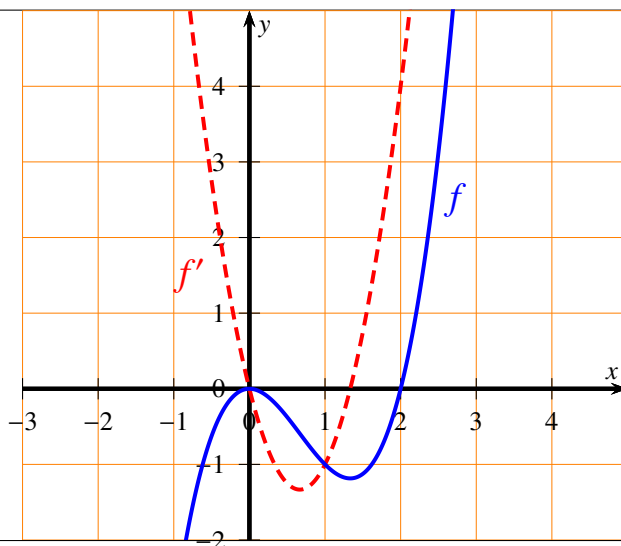
The diagram below shows the graph of
a function f and that of its derivative
function f'.

a) **Find** the value of $f(2)$ and $f'(2)$.   2 marks

b) **Determine** an equation of the
   tangent to the graph of f at the
   point where $x = 2$.   3 marks

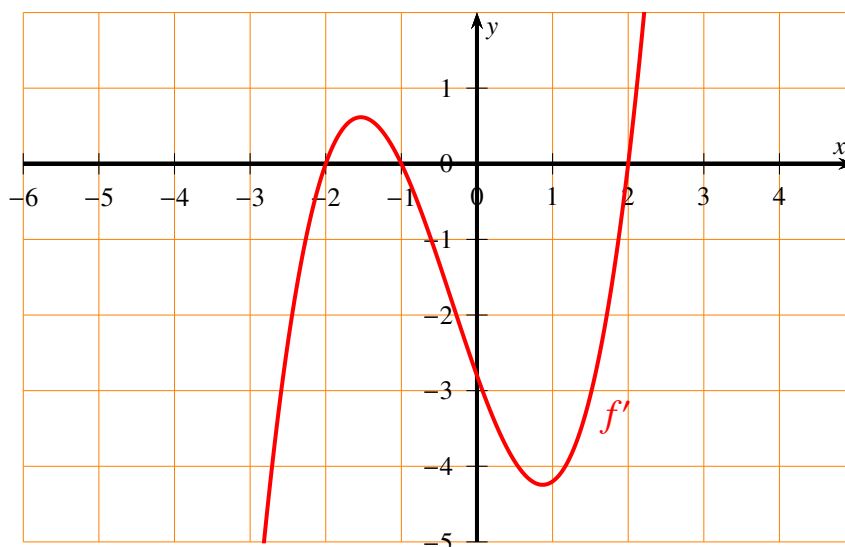**Exercise 2**   Calc. : ✗

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

a) **Give** the intervals on which the function f is increasing.   2 marks

b) **Determine** whether the function f has a local maximum. **Justify** your answer.   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 $F' = f$.   3 marks

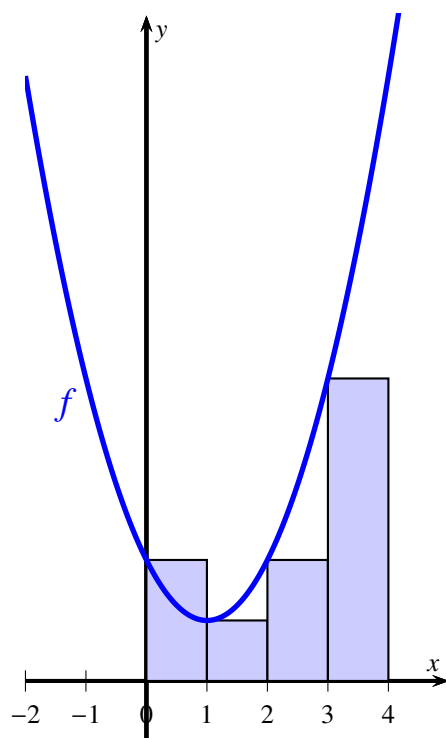b) **Find** the value of the parameter d such that $F(1) = \dfrac{1}{12}$.   2 marks

Exercise 4

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.
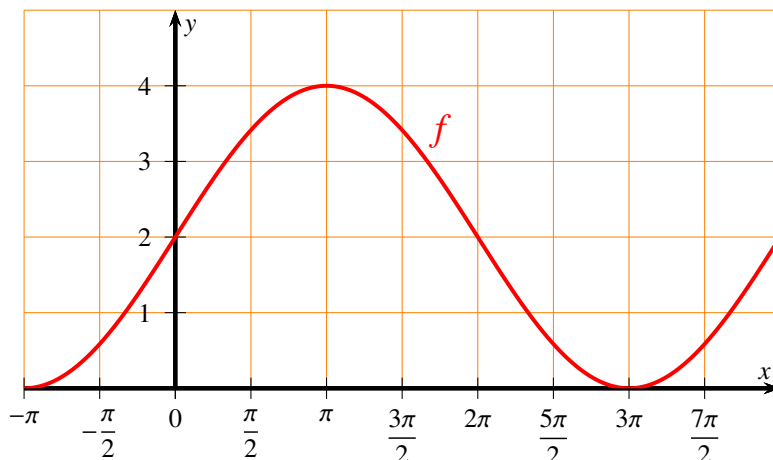
2 marks

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,   5 marks

- **determine** the amplitude, the period and the vertical shift of f, then **give** the values of a, b and d.

- **find** $f(\pi)$ and $f(9\pi)$.

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

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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.

a) **Draw** a tree diagram of the situation described.   2 marks

b) A plate is broken during the washing of the dishes after the selected dinner. **Calculate** the   3 marks
   probability that Kuba washed the dishes.

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.

a) **Determine** if the events A and B are independent. **Justify** the answer.   2 marks

b) **Calculate** $P(A \cup B)$.   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