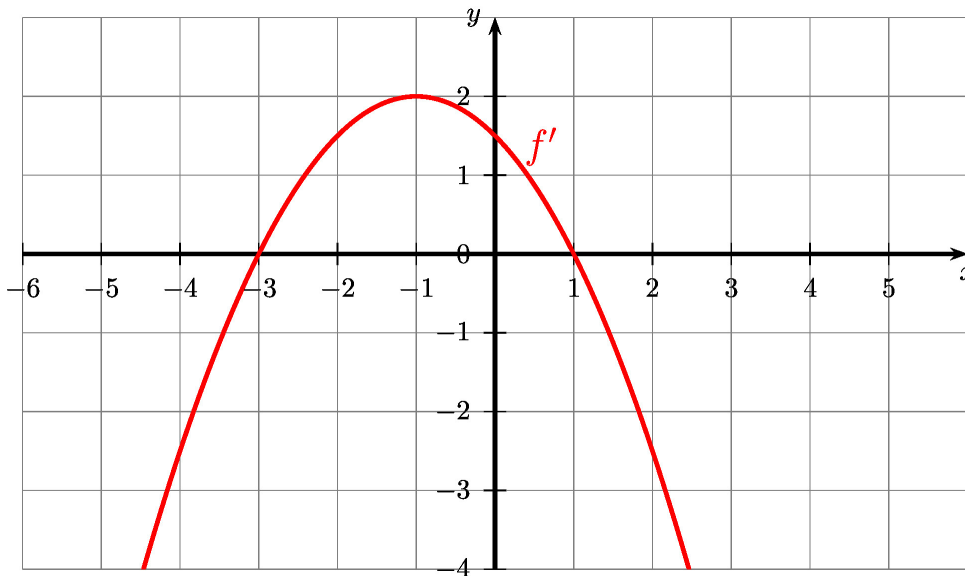


**Exercise 1**

Calc. : ✗

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

5 marks



- a) Give the intervals on which the function  $f$  is decreasing and those on which the function  $f$  is increasing.
- b) Determine whether the function  $f$  has extremums. If yes, determine their nature. Justify your answers.

**Exercise 2**

Calc. : ✗

Consider the function  $f$  defined by  $f(x) = x^2 - 7x + 3$ .Find the primitive  $F$  of  $f$  given that  $F(2) = 5$ .

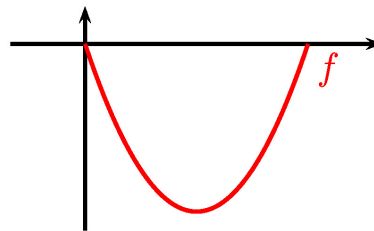
5 marks

**Exercise 3**

Calc. : ✗

It is a very hot summer, so Jim is digging a hole in the garden for a pool. Today it's raining so he is sitting inside and wonder how deep the hole is already. He knows that it needs to be at least 2 meters deep. He knows that the hole can be described as the following function:

$$f(x) = x^2 - 3x$$



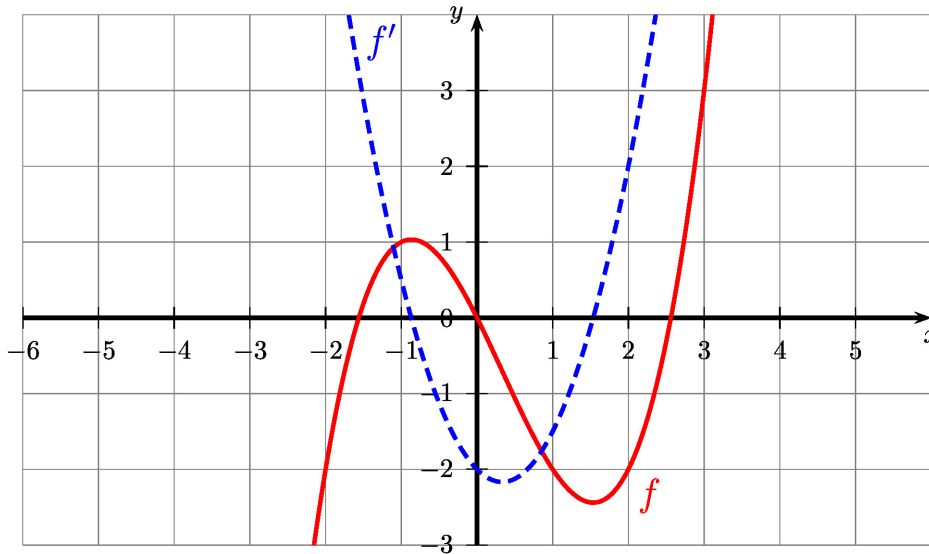
Determine if the hole is deep enough. Justify your answer by calculating how deep he already has been digging.

5 marks

**Exercise 4**

Calc. : **X**  
5 marks

The diagram shows the graphs of a function  $f$  and of its derivative  $f'$ .



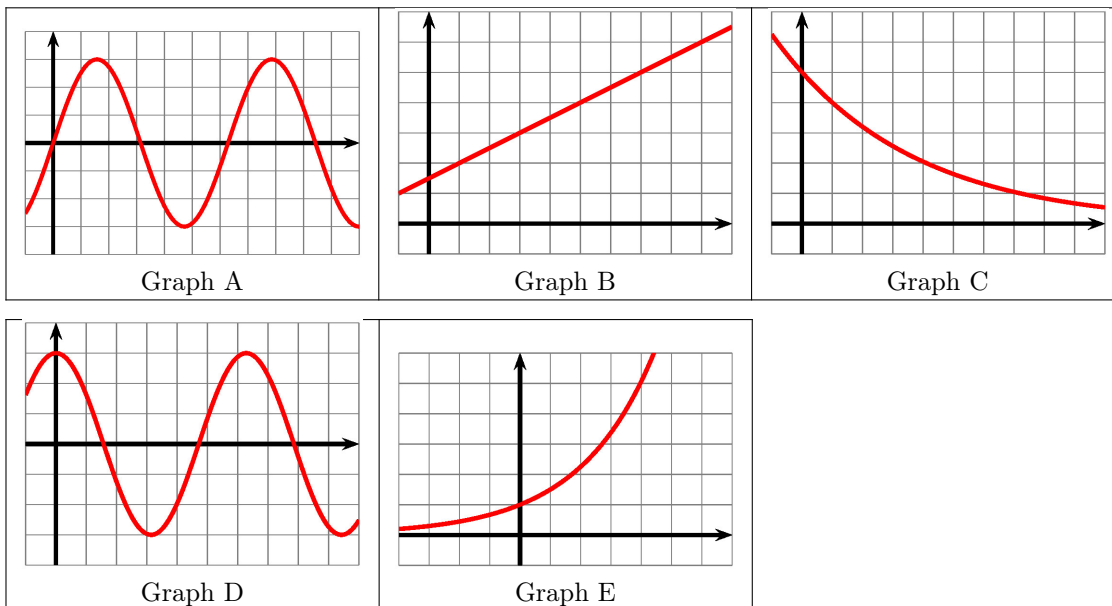
- a) **Determine**  $f(2)$  and  $f'(2)$ .
- b) **Determine** an equation of the tangent to the graph of  $f$  at the point where  $x = 2$ .

**Exercise 5**

Calc. : **X**  
5 marks

In the following, three function equations (with  $a$  and  $b$  being positive real numbers) and the graphs of five real functions are shown.

$f(x) = a \cdot b^x$  with  $b > 1$  ;      $g(x) = a \cdot x + b$  ;      $h(x) = a \cdot \sin(b \cdot x)$ .

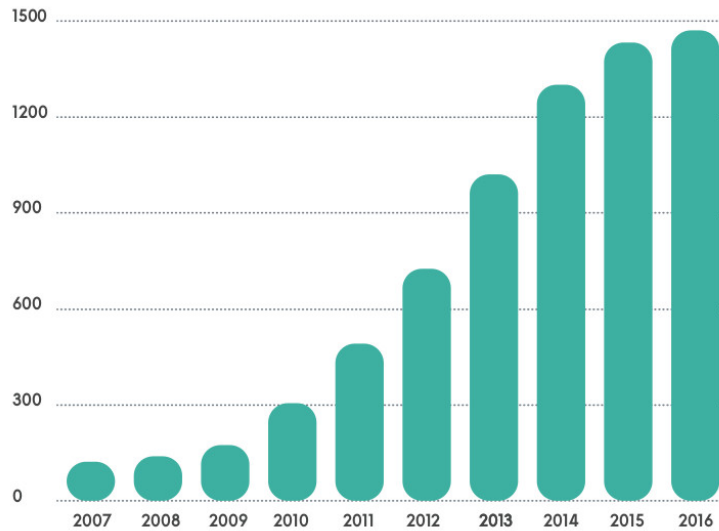


- a) **Assign** the appropriate graph (from A to E) to each of the three function equations (from  $f$  to  $h$ ).
- b) For the two remaining function graphs, **state** which model each represents.

**Exercise 6**Calc. : **X**

In 2007, almost no one owned a smartphone. In 2017, they are seemingly everywhere. Globally, among people aged 18–35, nearly 2 in every 3 people own a smartphone. The graph below shows the number of smartphones sold each year, from 2007, in millions.

5 marks



- a) Between 2009 and 2013, **give** the model would you use to describe the evolution of the number of smartphones sold.
- b) Starting from 2014, the previous model is not valid anymore. **Give** a possible reason that explains this.

**Exercise 7**Calc. : **X**

In the cafeteria, they sell sandwiches.  $\frac{3}{4}$  of people choose chicken, the rest choose tuna sandwich. **Calculate** the probability of selling exactly 2 chicken sandwiches to the next 3 customers.

5 marks

**Exercise 8**Calc. : **X**

The probability that a man is at the supermarket because his wife sent him is  $\frac{2}{3}$ .  
 The probability that a man sent by his wife to the supermarket has the necessary coin for the trolley is  $\frac{1}{5}$ .  
 The probability that a man that is at the supermarket not sent by his wife has the coin for the trolley is  $\frac{3}{5}$ .

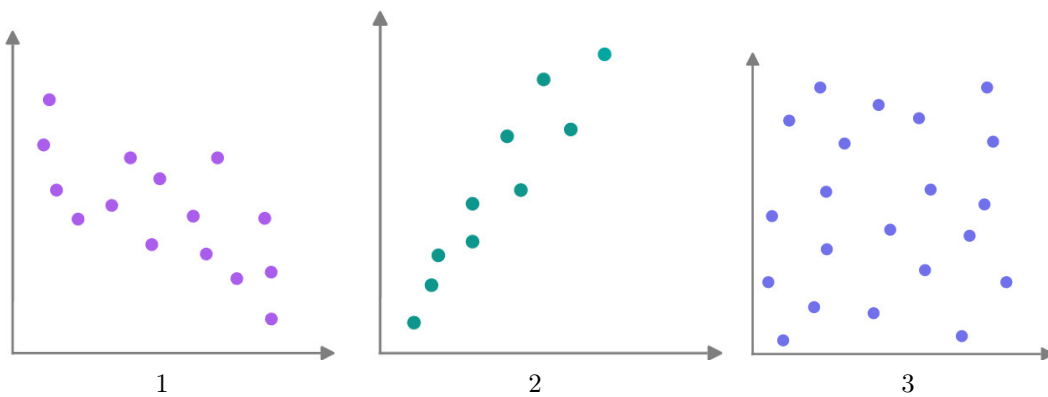
5 marks

- a) **Draw** a tree diagram of the situation described above.
- b) A man has the coin for the trolley. **Compute** the probability that he has been sent to the supermarket by his wife.

**Exercise 9**

Calc. : ✗

Three scatter diagrams can be seen in the figures below:



**Match** each of them (1, 2, 3) with the most appropriate statement (a, b, c) and **explain** your answers.

- a : We graphed a man's age and the number of hairs on his head.
- b : We graphed a woman's shoe size and the length of her hair.
- c : We graphed a person's eating and weight gain.

5 marks

**Exercise 10**

Calc. : ✗

It is assumed that the better children master their first language (mother tongue), the more successful they will be in their second language.

In a preschool group, 12 bilingual children were tested in their mother tongue and their second language. The maximum score for each test was 20 points. The results of the two tests are shown in the tables below:

Marks First Language	5	9	12	13	15	16	18	19	20
Marks Second Language	5	5	5	8	5.5	9.5	13	19	20

- a) **Draw** a scatter diagram using the data from the table. The points of the first language is the independent variable and the points in the second language is the dependent variable.
- b) The linear correlation coefficient is  $r = 0.84$ . **Interpret** the relationship between the two variables in this context using this correlation coefficient.
- c) We decide to use an exponential regression. **Draw** on the graph of question a) the graph of an exponential function that fits these results.

5 marks