

MATHEMATICS 5 PERIODS

PART A

DATE : 6th June 2016, afternoon

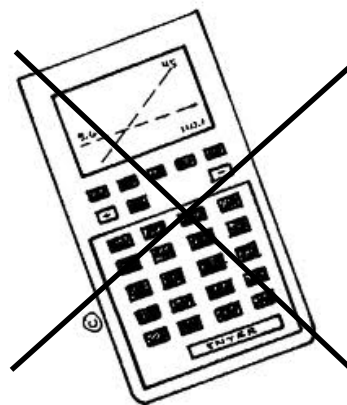
DURATION OF THE EXAMINATION:

1 hour (60 minutes)

AUTHORIZED MATERIAL:

Examination without technological tool

Pencil for the graphs

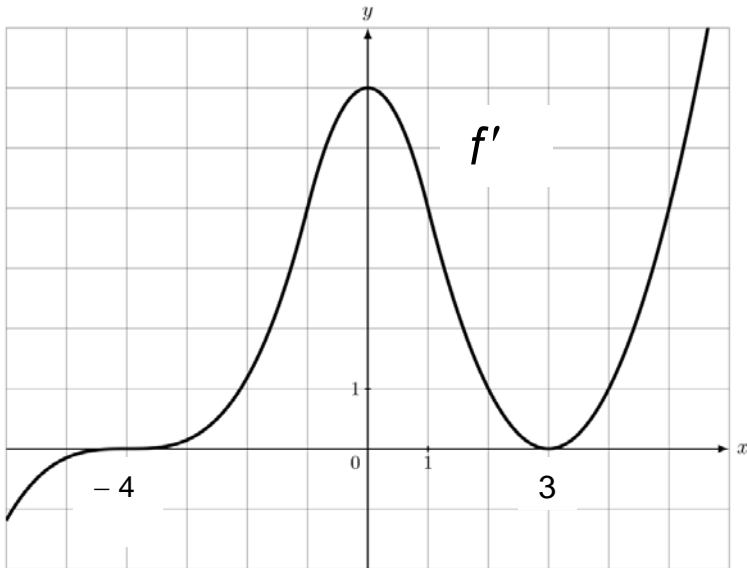


SPECIFIC INSTRUCTIONS:

- Answers must be supported by explanations.
- They must show the reasoning behind the results or solutions provided.
- If graphs are used to find a solution, they must be sketched as part of the answer.
- Unless indicated otherwise, full marks will not be awarded if a correct answer is not accompanied by supporting evidence or explanations of how the results or the solutions have been achieved.
- When the answer provided is not the correct one, still some marks can be awarded if it is shown that an appropriate method and/or a correct approach has been used.

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PART A		
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1) Consider the function f , defined by $f(x) = x + e^{-x}$. Calculate the coordinates of the extremum of f and determine its nature.		4 marks
2) In a 3-dimensional space, consider the points $A(2, 4, -1), \quad B(k, -k, k) \text{ and } C(-k, -k, k)$ where k is a real number. Determine the values of k so that the line that passes through the points A and B is perpendicular to the line that passes through the points A and C .		4 marks
3) In a random experiment consider the events A and B . Given the following probabilities: $P(A) = \frac{1}{4}, \quad P(B) = \frac{1}{2} \quad \text{and} \quad P(A \cup B) = \frac{2}{3}.$ Determine whether the events A and B are independent.		3 marks
4) A sequence (u_n) is given by $u_1 = \frac{1}{2} \quad \text{and} \quad u_n = \frac{n+1}{2n} \cdot u_{n-1} \quad \text{where } n > 1.$ Show that the sequence (u_n) is decreasing.		4 marks
5) Solve the equation $3iz - \bar{z} = 3i + z + 1$ where z is a complex number and \bar{z} is the complex conjugate of z .		5 marks

PART A		
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<p>6) The diagram below shows the graph of the derivative f' of a polynomial function f.</p>		
		
<p>For each of the values $x = -4$, $x = 0$ and $x = 3$ explain whether f has a maximum, minimum or a point of inflection.</p>		5 marks
<p>7) A statistical study of the players of a certain video game shows that: 48 % of the players are male. 80 % of the players are 18 years or older, and among these 60 % are female.</p> <p>A player is chosen at random. Given that this player is under 18 years old, calculate the probability that this player is female.</p>		5 marks