

Exercise 1

Calc. : ✗

5 marks	<p>The figure opposite shows the graph Cf' of the derivative $f'(x)$ of the function $f(x)$. Use this graph to determine the intervals over which the function $f(x)$ is decreasing.</p>	
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Exercise 2

Calc. : ✗

5 marks	<p>Determine the equation of the line tangent to the function</p> $f(x) = 3x^2 - 11x$ <p>at the point where the value of the instantaneous slope of the function is 1.</p>
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Exercise 3

Calc. : ✗

5 marks	<p>A small bag of lollipops is left in a classroom. Half of the lollipops are green, the rest are red. 10 pupils enter the classroom, pick a lollipop from the bag at random, one after the other, and eat it.</p> <p>Is picking a green lollipop in this context a Bernoulli process? Justify your answer.</p>
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Exercise 4

Calc. : ✗

5 marks	<p>European Union regulations prohibit airlines from refusing to transport people with reduced mobility solely because of their disability. In Luxembourg, it is estimated that around 1% of people with reduced mobility use airline travel. It is assumed that the population flying out of Luxembourg is large enough that the probability of selecting a person with reduced mobility is constant.</p> <p>On an airline flight from Luxembourg to London, only two out of 150 seats were reserved for persons with reduced mobility.</p> <p>Justify the airline's decision to limit the number of seats reserved for persons with reduced mobility to two.</p>
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Exercise 5

Calc. : ✗

3 marks	<p>The value of a certain luxury wine is growing rapidly. The price for a single bottle can be modelled by the function:</p> $f(t) = 1\,400 \cdot e^{\ln(1.10) \cdot t}$ <p>where $f(t)$ is the price for a bottle in Euros and t is years after 2020.</p> <p>a) Interpret the two numbers 1 400 and 1.10.</p>
2 marks	<p>b) Calculate the price of a bottle in 2021.</p>

Exercise 6

Calc. : ✗

1 mark	<p>Let f be the function defined by: $f(x) = \ln(x)$.</p> <p>a) Give the domain of f.</p>
1 mark	<p>b) Give the limit of f when x approaches $+\infty$.</p>
1.5 marks	<p>c) Determine any intervals over which f is increasing or decreasing.</p>
1.5 marks	<p>d) Give the inverse function of $f(x)$.</p>

Exercise 7

Calc. : ✗

5 marks	Let $f(x) > g(x)$ be two positive functions, with respective primitives $F(x)$ and $G(x)$. It is further known, that:									
	<table><tr><td>x</td><td>1</td><td>4</td></tr><tr><td>$F(x)$</td><td>-3</td><td>8</td></tr><tr><td>$G(x)$</td><td>2</td><td>6</td></tr></table>	x	1	4	$F(x)$	-3	8	$G(x)$	2	6
	x	1	4							
	$F(x)$	-3	8							
$G(x)$	2	6								
Determine the area bounded by the graphs of $f(x)$ and $g(x)$ and the lines of equations $x = 1$ and $x = 4$.										

Exercise 8

Calc. : ✗

5 marks	The graph of the function $y = f(x)$ is presented here:
	<p>Given the following results:</p> $\int_b^c f(x) dx = 2.3 \qquad \int_a^c f(x) dx = -1.1 \qquad \int_b^d f(x) dx = -0.4$ <p>... calculate the value of the shaded area.</p>

Exercise 9

Calc. : ✗

	The table below gathers the values of two variables x and y :														
	<table><tr><td>x</td><td>0</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td></tr><tr><td>y</td><td>6</td><td>7</td><td>10</td><td>14</td><td>15</td><td>20</td></tr></table>	x	0	2	4	6	8	10	y	6	7	10	14	15	20
x	0	2	4	6	8	10									
y	6	7	10	14	15	20									
3.5 marks	a) Draw a scatter diagram using these values.														
1.5 marks	b) Compute and add the mean point to your graph.														

Exercise 10

Calc. : ✗

1 mark 1 mark 1 mark 1 mark 1 mark	State if the following sentences are True (T) or False (F) and justify your statements:
	a) The point A(e; 1) belongs to the function $y = \ln(x)$.
	b) When a function is positive, its first derivative is necessarily increasing.
	c) Let f be a function defined by $f(x) = e^x - 1$. Its first derivative is equal to zero for $x = 0$.
	d) Let f be a function defined over \mathbb{R} such that $\int_0^3 f(x) dx > 0$ and $\int_3^6 f(x) dx < 0$.
	We can thus write : $\int_0^6 f(x) dx = 0$
1 mark	e) A set of bivariate data points $(x; y)$ has a linear correlation coefficient of -0.95 . We can thus state that the correlation is weak.