Exercise 1	Calc. : 🗡
Consider the function $f$ defined by	
$f(x) = 2x^3 - 9x^2 + 45.$	
<b>Determine</b> the coordinates of the extrema of the function $f$ and <b>specify</b> their nature.	5 marks
Exercise 2	Calc. : 🗡
The diagram below shows the graph of a function $g$ .	
g $y$ $y$ $z$	
<b>Specify</b> for each of the following expressions, whether it represents the hatched area. <b>Justify</b> your answer.	5 marks
a) $\int_{a}^{c} g(x)  \mathrm{d}x$	
b) $\int_{a}^{b} g(x) dx + \int_{b}^{c} g(x) dx$	
c) $\left  \int_{a}^{c} g(x)  \mathrm{d}x \right $	
$d) - \int_{a}^{b} g(x) dx + \int_{b}^{c} g(x) dx$	

Exercise 3	Calc. : 🗡		
A car is travelling along a horizontal road and the distance from the origin is observed over a			
period of 8 seconds, starting at $t = 4$ seconds.			
The distance is given by the function $d$ defined by			
$d(t) = \frac{1}{4}t^3 - 2t^2 + 5t + 3 \qquad \text{with } t \in [4, 12],$			
where t is the time expressed in seconds, and $d(t)$ is expressed in metres.			
a) <b>Show</b> that at the start of the observation, the car is 7 metres from the origin.	$1 \mathrm{mark}$		
b) <b>Determine</b> the average velocity of the car between 4 seconds and 10 seconds.	2  marks		
c) <b>Determine</b> the instantaneous velocity of the car at $t = 10$ seconds.	2  marks		



area of the lake decreases by $10\%$ each year. The initial surface area of the lake is 5 km <sup>2</sup> .			
a) <b>Explain</b> why the surface area of the lake can be modelled by a function <i>s</i> defined by $s(t) = 5 \cdot 0.9^t$ , where <i>t</i> is the number of years since year 2000 and $s(t)$ is expressed in km <sup>2</sup> .	2 marks		
b) Using this model, <b>determine</b> the surface area of the lake in 2002.	1 mark		
c) Assume the model will remain valid over time.			
<b>Describe</b> the evolution of the surface area of the lake over time.	2 marks		

<b>Describe</b> the evolution	of the surface area of the	lake over time.
<b>2</b> 05 01 15 0 010 0 0 01 0 10 10 10	or the surface area or the	iane ever time.

Exercise 6	Calc. : 🗡
Peter applies for his first job. He sends his CV letter to 2 different companies.	
The probability that exactly one company will reply to him is 0.45.	
The probability that no company will reply to him is 0.3.	
a) <b>Draw</b> a Venn diagram to illustrate the above information.	2 marks
b) <b>Determine</b> the probability that both companies will reply to Peter. <b>Give</b> the answer as a percentage.	3 marks

Exercise 7	Calc. : 🗡		
The distribution of peppers at a grower's market stand is as follows:			
$\frac{2}{5}$ of peppers are green, of which half are organic.			
$\frac{9}{20}$ of peppers are red, of which 40% are organic.			
$\frac{3}{20}$ of peppers are yellow, of which 80% are organic.			
Å pepper is chosen at random.			
<b>Determine</b> the probability that this pepper is organic.			

Exercise 8	Calc. : 🗡
In a football team composed of 18 players, 3 are goalkeepers, 5 are defenders, 6 are midfielders	
and 4 are forwards.	
a) The trainer chooses 3 of those defenders to play the next match.	
<b>Calculate</b> how many different groups of three defenders the trainer can choose.	$1 \mathrm{mark}$
b) The three defenders have been chosen. Now, one of them is assigned the left part of the field, one of them is assigned the central part, and one of them is assigned the right part.	
<b>Calculate</b> in how many different ways those 3 defenders can position themselves on the field.	$1 \mathrm{mark}$
c) 11 players are to be selected to play the game: this team will consist of 1 goalkeeper, 3 de- fenders, 5 midfielders and 2 forwards.	
The 3 defenders have been chosen.	
<b>Determine</b> how many different groups of 8 players the trainer can choose to fill the remaining places.	3 marks



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In a population of fish, approximatively 42% are female. A test is conducted because it is possible									
that, in f	act, this pro	oportion is le	ess.						
,	/ I	-							
a) Stat	e the null b	h where $h$ and $h$ are the set of h and $h$ are the set of $h$ and $h$ are the set of h and $h$ are the set of $h$ and $h$ are the set of h and $h$ are the set of $h$ are the set of h and $h$ are the set of h are the set of h and $h$ are the set of h are the set of h are the set of h and $h$ are the set of h are the set of h are the set of h and $h$ are the set of h and $h$ are the set of h and $h$ are the set of h are the set of h and $h$ are the set of h and $h$ are the set of h are the set of h and $h$ are the set of h and $h$ are the set of h are the set of h are the set of h are th are the set of h are the set of h are th are the set of	$I_0$ and the a	lternative hy	vpothesis $H_1$				2 marks
)	a) State the half hypothesis high and the attendance hypothesis high								
b) Let	b) Let X be the random variable that gives the number of female fish in a sample of 20 fish.						fish.		
The	The table below shows values of $P(X \le k)$ for $k = 3$ A 5 6 7 8 for a probability of 42% that								
a given being formula									
a given fish is a female.									
	k	3	4	5	6	7	8		
	$P(X \ge k)$	0.0102	0.0349	0.0922	0.1959	0.3461	0.5229		1
<b>Determine</b> the critical value $k$ if the significance level is set at 5%, and <b>interpret</b> this value.					alue.	3 marks			