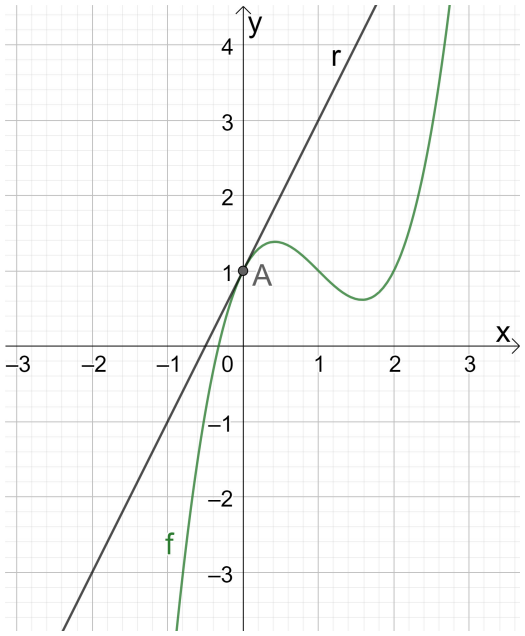
Exercise 1 Calc. : ✗

Give the derivative $f'(x)$ of the following functions:	
1. $f(x) = x^3 - 3x^2$	2 marks
2. $f(x) = 2x^2 + x - 3$	2 marks
3. $f(x) = \frac{1}{2}x - \frac{1}{3}x^3 + \frac{2}{3}x^6$	2 marks

Exercise 2 Calc. : ✗

Consider the graph of the function f shown below. The line r is a tangent line to the graph of f at point A.



1. Use the information in the diagram to find the equation of the line r.	4 marks
2. Given that $f(x) = x^3 - 3x^2 + 2x + 1$, use the diagram or otherwise to find the value of $f'(0)$.	4 marks

Exercise 3 Calc. : ✗

A town's population is growing linearly. In 2018 the population was 5 000. By 2020 the population had increased to 7 400.	
1. Give the function $P(t)$ where P is the population and t is the number of years since 2018.	3 marks
2. Use your function $P(t)$ to predict the population in 2025.	2 marks
3. According to this model in which year will the population reach 19 400?	2 marks

Exercise 4 Calc. : ✗

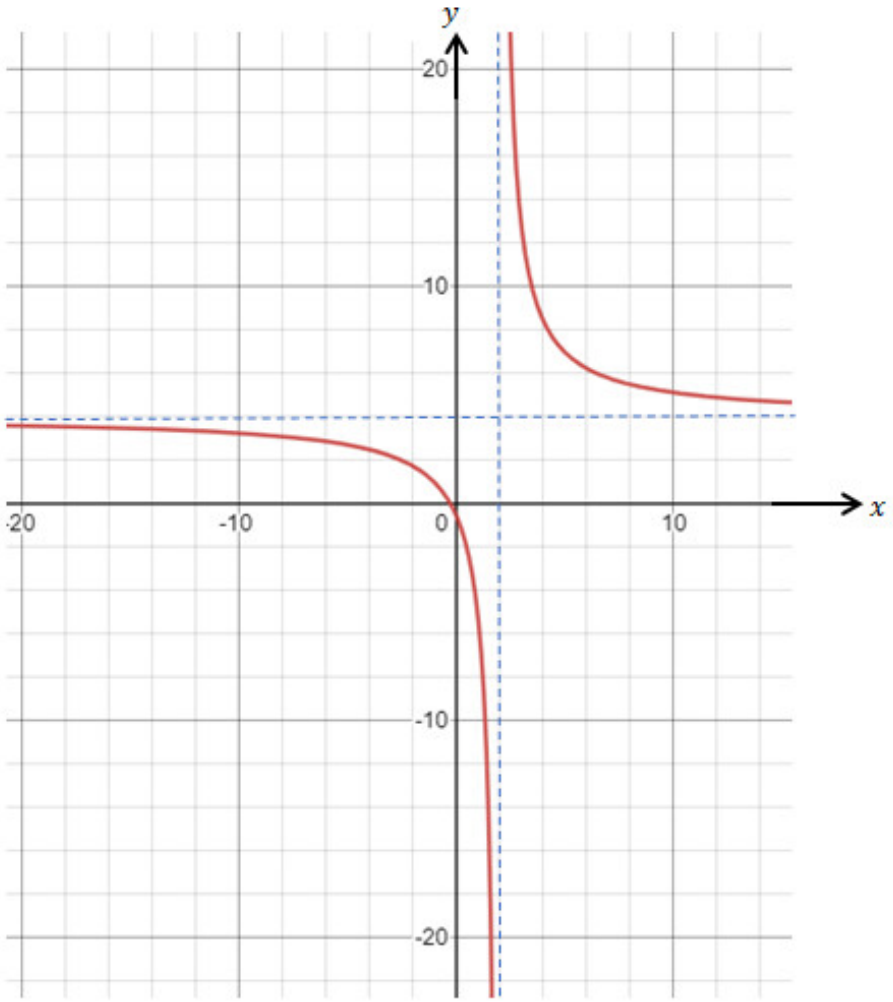
The function f is defined as $f(x) = 2x^2 - 8x + 8$.	
1. Determine the coordinates of the y-intercept.	2 marks
2. Calculate $f(2)$	2 marks
3. Determine the derivative $f'(x)$.	2 marks
4. For what value of x does the function $f(x)$ have a turning point? State the nature of the turning point and explain your answer.	3 marks
5. Find the equation of the tangent to the curve at the point $(1, 2)$.	4 marks
6. The point A is a point on the graph of f. The gradient at the point A is equal to 12. Find the coordinates of the point A.	4 marks

Exercise 5 Calc. : ✗

The diagram below shows the graph of the function $f(x) = \dfrac{ax+b}{x+c}$.

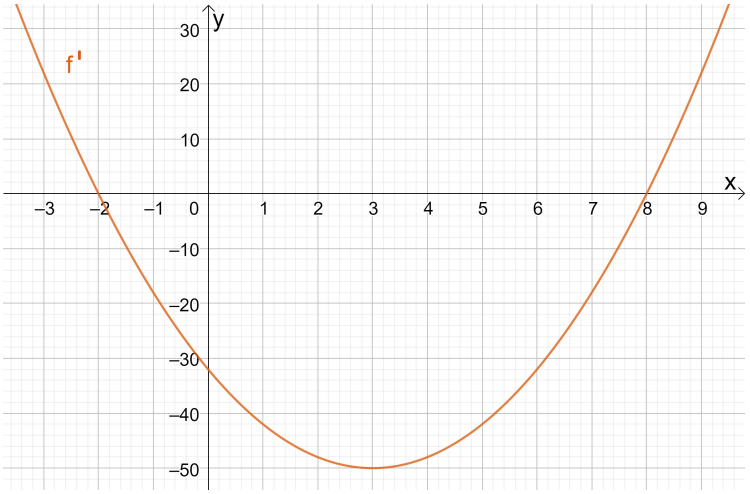
The dotted blue lines represent the asymptotes. The graph passes through the point $\left(0, -\frac{1}{2}\right)$.

1. Give the equation of the vertical asymptote. 2 marks
2. State the domain of the function. 2 marks
3. Find value of c. 2 marks
4. Give the equation of the horizontal asymptote. 2 marks
5. State the range of the function. 2 marks
6. Find value of a. 2 marks
7. A student says that the value of b is 1. Are they correct? You must justify your answer. 2 marks



Exercise 6 Calc. : ✗

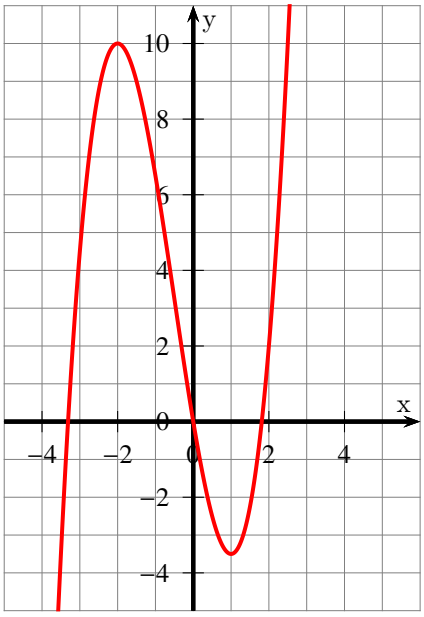
The graph of the derivative $f'(x)$ is given below.



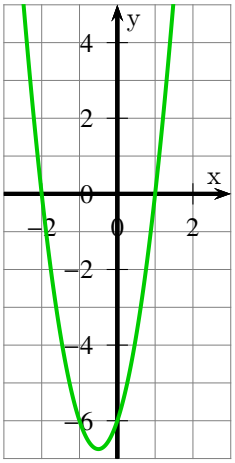
1. Give the x-coordinates of the two turning points. 2 marks
2. For which values of x is the graph of $f(x)$ increasing? 2 marks
3. For which value of x does $f(x)$ reach a minimum? 2 marks
4. Sketch a possible graph of $f(x)$, given that the point $(8, 0)$ lies on the graph of $f(x)$. 3 marks

Exercise 7 Calc. : ✗

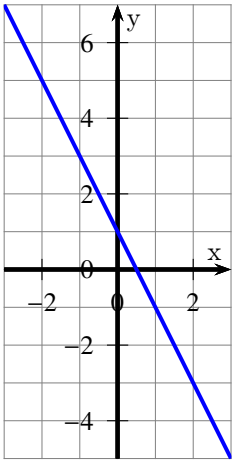
The graph below is the graph of the function f.



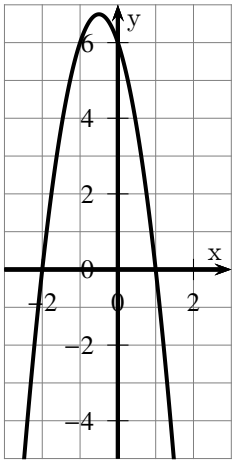
Which of the 4 graphs below is the corresponding graph of f'? 4 marks
For each graph you **must** explain why it is or is not the correct graph.



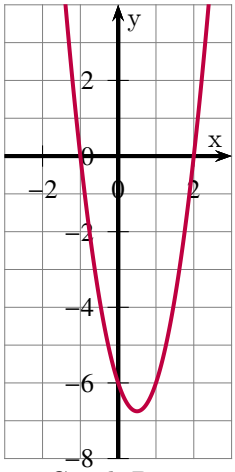
Graph A



Graph B



Graph C



Graph D