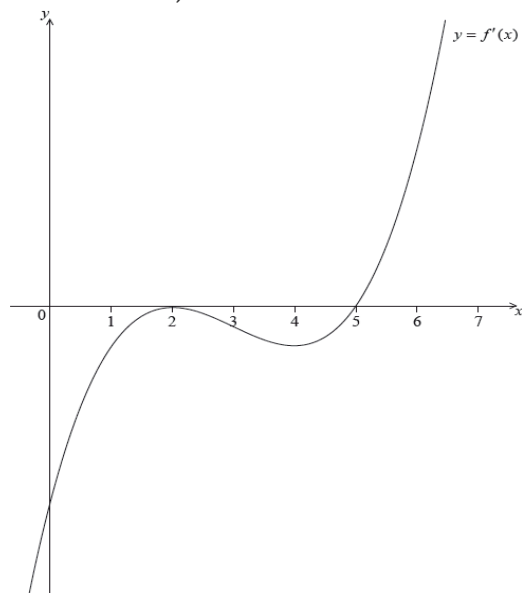


31 October 2017

Homework: Calculus exam problems

1a. Let $y = f(x)$, for $-0.5 \leq x \leq 6.5$. The following diagram shows the graph of f' , the derivative of f .



The graph of f' has a local maximum when $x = 2$, a local minimum when $x = 4$, and it crosses the x -axis at the point $(5, 0)$.

Explain why the graph of f has a local minimum when $x = 5$. [2 marks]

1b. Find the set of values of x for which the graph of f is concave down. [2 marks]

2a. A function f has its derivative given by $f'(x) = 3x^2 - 2kx - 9$, where k is a constant. Find $f''(x)$. [2 marks]

2b. The graph of f has a point of inflexion when $x = 1$. Show that $k = 3$. [3 marks]

2c. Find $f'(-2)$. [2 marks]

2d. Find the equation of the tangent to the curve of f at $(-2, 1)$, giving your answer in the form $y = ax + b$. [4 marks]

2e. Given that $f'(-1) = 0$, explain why the graph of f has a local maximum when $x = -1$. [3 marks]