

Spiral Review: 6-2 P1 (No Calculator) Calculus Differentiation

1. 11M.1.sl.TZ2.4 [6 marks]
Let $h(x) = \frac{6x}{\cos x}$. Find $h'(0)$.

2. 11M.1.sl.TZ1.5 [7 marks]
Let $g(x) = \frac{\ln x}{x^2}$, for $x > 0$.

(a) Use the quotient rule to show that $g'(x) = \frac{1-2\ln x}{x^3}$ [4]

(b) The graph of g has a maximum point at A . Find the x -coordinate of A . [3]

3. 09N.1.sl.TZ0.5 [6 marks]
Consider $f(x) = x^2 + \frac{p}{x}$, $x \neq 0$, where p is a constant.

(a) Find $f'(x)$ [2]

(b) There is a minimum value of $f(x)$ when $x = -2$. Find the value of p . [4]

4. 17M.1.sl.TZ2.6 [6 marks]
The values of the functions f and g and their derivatives for $x = 1$ and $x = 8$ are shown in the following table.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	4	9	-3
8	4	-3	2	5

Let $h(x) = f(x)g(x)$

(a) Find $h(1)$ [2]

(b) Find $h'(8)$ [3]

5. 09M.1.sl.TZ2.6 [5 marks]
A function f has its first derivative given by $f'(x) = (x - 3)^3$.

(a) Find the second derivative. [2]

(b) Find $f'(3)$ and $f''(3)$. [1]

(c) The point P on the graph of f has x -coordinate 3. Explain why P is not a point of inflexion. [2]

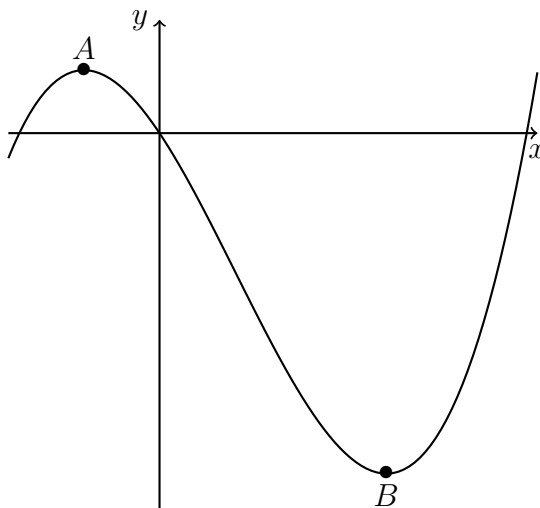
6. 14M.1.sl.TZ1.7 [7 marks]
Let $f(x) = px^3 + px^2 + qx$.

(a) Find $f'(x)$. [2]

(b) Given that $f'(x) \geq 0$, show that $p^2 \leq 3pq$. [5]

7. SPNone.1.sl.TZ0.7 [7 marks]
Given that $f(x) = \frac{1}{x}$, answer the following.

- (a) Find the first four derivatives of $f(x)$. [4]
(b) Write an expression for $f^{(n)}(x)$ in terms of x and n . [3]
8. 09M.1.sl.TZ2.8 [6 marks]
Let $f(x) = e^{-3x}$ and $g(x) = \sin(x - \frac{\pi}{3})$.
- (a) Write down [2]
i. $f'(x)$;
ii. $g'(x)$.
- (b) Let $h(x) = e^{-3x} \sin(x - \frac{\pi}{3})$. Find the exact value of $h'(\frac{\pi}{3})$. [4]
9. 10M.1.sl.TZ1.8 [14 marks]
Let $f(x) = \frac{1}{3}x^3 - x^2 - 3x$. Part of the graph of f is shown below.



There is a maximum point at A and a minimum point at $B(3, -9)$.

- (a) Find the coordinates of A . [8]
(b) Write down the coordinates of [6]
i. the image of B after reflection in the y -axis;
ii. the image of B after translation by the vector $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$;
iii. the image of B after reflection in the x -axis followed by a horizontal stretch with scale factor $\frac{1}{2}$.

Name:

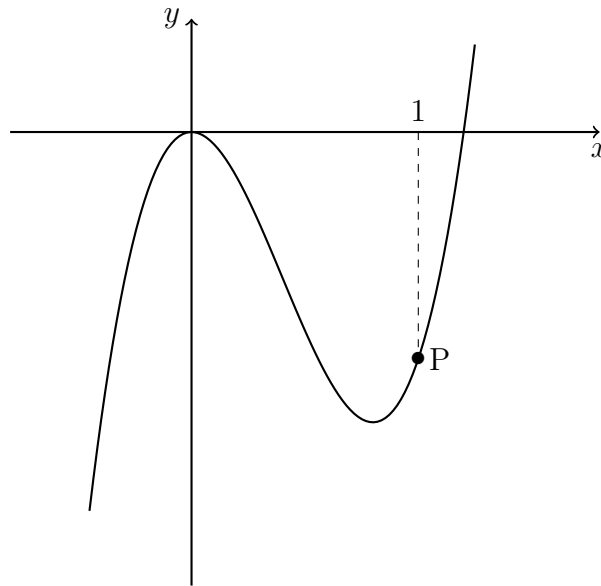
10. x

Let $f(x) = e^{6x}$.

- (a) Write down $f'(x)$ [1 mark]
- (b) The tangent to the graph of f at the point $P(0, b)$ has gradient m . [4 marks]
 - i. Show that $m = 6$.
 - ii. Find b .
- (c) Hence, write down the equation of this tangent. [1 mark]

11. x

Part of the graph of $f(x) = ax^3 - 6x^2$ is shown below.



The point P lies on the graph of f . At P , $x = 1$.

- (a) Find $f'(x)$. [2 marks]
- (b) The graph of f has a gradient of 3 at the point P . Find the value of a . [4 marks]