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

   (a) Write down $f'(x)$ [1 mark]

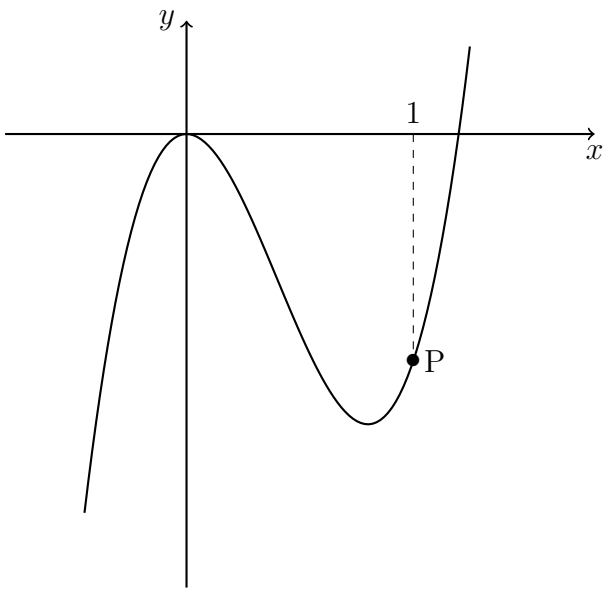
   (b) The tangent to the graph of f at the point $P(0, b)$ has gradient m. [4 marks]

      i. Show that $m = 6$.

      ii. Find b.

   (c) Hence, write down the equation of this tangent. [1 mark]

8. 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]