22 January 2019 Name:

Spiral Review: 6-1 P1 (No Calculator) Calculus Tangents

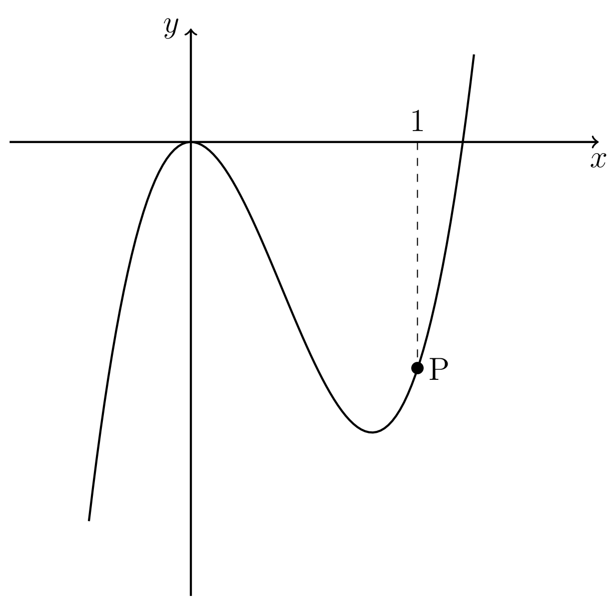
1. 10N.1.sl.TZ0.2
   Let $g(x) = 2x \sin x$.
   (a) Find $g'(x)$ [4 marks]
   (b) Find the gradient of the graph of g at $x = \pi$. [3 marks]

2. 12M.1.sl.TZ1.3
   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]

3. 09M.1.sl.TZ1.3
   Let $f(x) = e^x \cos x$. Find the gradient of the normal to the curve of f at $x = \pi$.

4. 13M.1.sl.TZ1.3
   Consider $f(x) = x^2 \sin x$.
   (a) Find $f'(x)$. [4 marks]
   (b) Find the gradient of the curve of f at $x = \frac{\pi}{2}$. [3 marks]

5. 12N.1.sl.TZ0.4
   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]

6. 17N.1.sl.TZ0.5
Let $f(x) = 1 + e^{-x}$ and $g(x) = 2x + b$, for $x \in \mathbb{R}$, where b is a constant.

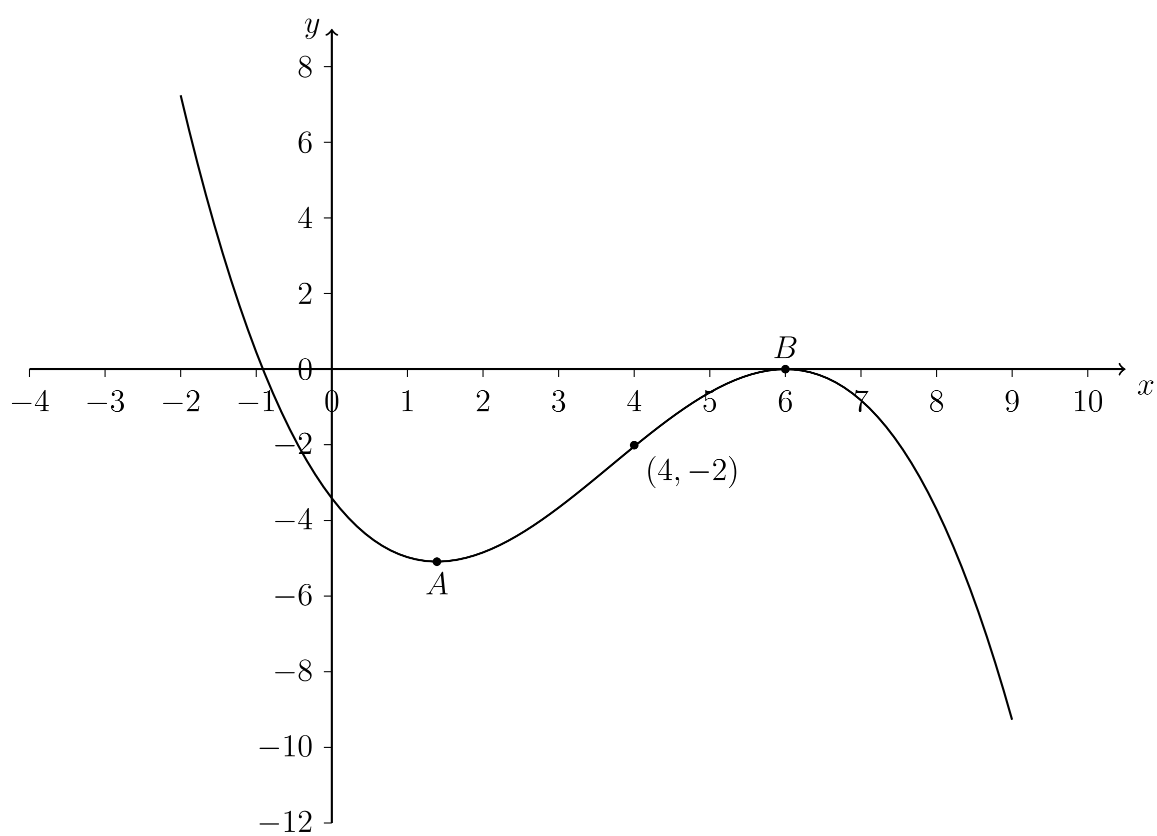
(a) Find $(f \circ g)(x)$. [2 marks]

(b) Given that $\lim_{n\to\infty} (f \circ g)(x) = -3$, find the value of b. [4 marks]

7. 10M.1.sl.TZ2.5 [6 marks]
Let $f(x) = kx^4$. The point $P(1, k)$ lies on the curve of f. At P, the normal to the curve is parallel to $y = -\frac{1}{8}x$. Find the value of k.

8. 13N.1.sl.TZ0.6 [6 marks]
Let $f(x) = e^{2x}$. The line L is the tangent to the curve of f at $(1, e^2)$.
Find the equation of L in the form $y = ax + b$.

9. 17M.1.sl.TZ1.6
The following diagram shows the graph of f', the derivative of f.



The graph of f' has a local minimum at A, a local maximum at B and passes through $(4, 2)$. The point $P(4, 3)$ lies on the graph of the function, f.

(a) Write down the gradient of the curve of f at P. [1 mark]

(b) Find the equation of the normal to the curve of f at P. [3 marks]

(c) Determine the concavity of the graph of f when $4 < x < 5$ **and** justify your answer. [2 marks]