1. Let \( f(x) \) be the function whose graph is shown below.

![Graph of a function](image)

Determine \( f'(a) \) for
(a) \( a = 1 \)
(a) \( 0 \)
(b) \( a = 2 \)
(b) \( 0 \)
(c) \( a = 4 \)
(c) \( \frac{1}{2} \)
(d) \( a = 7 \)
(d) \( 0 \)

2. In each case the limit represents a derivative \( f'(a) \). Find \( f(x) \) and \( a \)

(a) \( \lim_{h \to 0} \frac{\tan \left( \frac{\pi}{4} + h \right) - 1}{h} \)
(a) \( f(x) = \tan x, \ a = \frac{\pi}{4} \)

(b) \( \lim_{x \to 5} \frac{2^x - 32}{x - 5} \)
(b) \( f(x) = 2^x, \ a = 5 \)

3. Determine coefficients \( a \) and \( b \) such that \( p(x) = x^2 + ax + b \) satisfies \( p(1) = 9 \) and \( p'(1) = 5 \).

3. \( a = 3, b = 5 \)

4. If the tangent line to \( y = f(x) \) at \( (2, -6) \) passes through the point \( (-5, -8) \), find \( f(2) \) and \( f'(2) \).

4. \( f(2) = -6, \ f'(2) = 2/7 \)

5. Differentiate the following functions

(a) \( f(x) = e^x \sin x \)
(a) \( f'(x) = e^x \sin x + e^x \cos x \)

(b) \( g(x) = \cos(\sin x) \)
(b) \( g'(x) = -\sin(\sin x)) \cos x \)

(c) \( h(x) = e^{-5x} \cos(-9x) \)
(c) \( h(x) = -5e^{-5x} \cos(-9x) + 9e^{-5x} \)
(d) $k(x) = e^{\sqrt{3x+7}}$

(e) $m(x) = -4 \sin(\sin(x^5))$

(f) $p(x) = \ln(\tan x)$

(g) $q(x) = e^x \sec x$

6. Let $F(x) = f(f(x))$ and $G(x) = (F(x))^2$. Also suppose that $f(9) = 6$, $f(6) = 2$, $f'(6) = 3$, $f'(9) = 7$.
   (a) Find $F'(9)$

   (b) Find $G'(9)$

7. If $f$ and $g$ are the functions whose graphs are shown, let $u(x) = f(g(x))$, $v(x) = g(f(x))$, and $w(x) = g(g(x))$

   (a) Find $u'(1)$

   (b) Find $v'(1)$

   (c) Find $w'(1)$
8. Here are the graphs of four different functions. For each of the functions, decide which of the six pictures below is the graph of its derivative.

The possible derivatives:

1. ___________  2. ___________

3. ___________  4. ___________

8. 1F, 2D, 3C, 4A