1. Consider the function $f(x) = x^3 - 2x^2 + x - 3$.

   (a) Using the definition of $f'(2)$, the derivative of $f(x)$ at $x = 2$, which is $\lim_{h \to 0} \frac{f(2 + h) - f(2)}{h}$, determine $f'(2)$.

   (b) Using the definition of $f'(a)$, the derivative of $f(x)$ at $x = a$, which is $\lim_{h \to 0} \frac{f(a + h) - f(a)}{h}$, determine $f'(a)$

   (c) Using part (b):
      i. determine $f'(2)$ and the equation of the tangent line to $f(x)$ at $x = 2$.

         ii. determine $f'(-1)$ and the equation of the tangent line to $f(x)$ at $x = -1$.

      iii. determine the points on the curve where the tangent line has a slope of 1.

      iv. determine the points on the curve where the tangent line is horizontal.

2. (a) Consider the function $g(x) = 3^x$. Using the limit definition of the derivative, determine the derivative of $g(x)$ at $x = 0$.

   (b) Using part (a), determine the equation of the tangent line to the function $g(x)$ at $x = 0$. 

3. Use the differentiation rules to give the derivative of the function.

(a) \( f(x) = 3x^5 - 7x + 5 \) \( f'(x) = \)

(b) \( f(x) = \frac{7}{x} + 3\sqrt{x} - \frac{5}{\sqrt{x}} \)

(c) \( y = 5x^{\frac{3}{2}} + 2\sqrt{x} - 2x + 1 - \frac{2}{\sqrt{x}} + \frac{1}{x^2} \)

(d) \( y = e^x - 5^x + \left(\frac{1}{2}\right)^x \)

(e) \( g(x) = 4\sin 3x - 3\cos 2x + 2\tan 5x \)

4. Use the product and quotient rules to determine the derivative

(a) \( y = (x^2 - 7x + 5)(3x^4 + 5x^3 - 6x^2 - 1) \)

(b) \( f(x) = \frac{2x^3 - 7x + 6}{x^2 + 4} \)

(c) \( g(x) = 3x^2 \sin x - x \cos x \)

(d) \( h(x) = \frac{x + \sin 2x}{1 - \cos 3x} \)