1. Let $f(x) = x^2 + 3x + 1$. Using the definition of derivative, compute $f'(x)$.

2. Give an example of a function that is continuous from the left at $x = 0$ but that is not continuous from the right. Justify your work.

3. Compute $\lim_{x \to \infty} \frac{\sqrt{x} + x^3}{x^2 + 1}$

4. Given $f(x) = (x^3 + 5x^2 + 3x - 1)^8$, compute the derivative $f'(x)$.

5. Given $f(x) = (e^{3x} + 4x^2 - 1)^5$, compute $f'(x)$.

6. Given $f(x) = \left(\frac{x^2 - 2}{x + 1}\right)^3$, find the derivative $f'(x)$.

7. Given $f(x) = x^3 + 3x - 1$, show that there is a number $c$ in the interval $(0, 1)$, for which $f(c) = 0$. Explain your work carefully.

8. Find an equation of the tangent line to the curve $y = \frac{2x + 1}{x + 2}$ at the point $(2, 3)$.

9. Find the following limits:

   (a) $\lim_{x \to 3} \frac{x^2 - 9}{x^2 + 2x - 3}$

   (b) $\lim_{x \to 3} \frac{\sqrt{x + 6} - x}{x^3 - 3x^2}$

   (c) $\lim_{h \to 4^+} \frac{4 - h}{|4 - h|}$

   (d) $\lim_{x \to 0^+} \sin(\pi \ln(x))$