Lab Session 4

1. By calculating the left-hand derivative and the right-hand derivative of the function

$$f(1) = \begin{cases} -\frac{1}{3} + x^2 & x < 1 \\ \frac{2}{3} & x = 1 \\ \frac{2}{3}x^3 & x > 1 \end{cases}$$

   at $x = 1$ show that $f'(1)$ exists.

2. Use the definition of derivative to calculate the derivative of the function $f(x) = \sqrt{x^2 - 1}$ at the point $x = 2$

3. Find the equation of the tangent line at the point $(0\,, 1)$ on the graph of the function $y = x + \sqrt{x^2 + 1}$

4. Solve questions 22 , 23 , and 25 of section 3.7 of the textbook. Hint: Before any attempt to differentiation do not forget to write the root functions in the form of power functions.