Math.Econ.Anal.Test.1. 15.oct.20.

1. $(4+(1+1+2+1+1))$ points)

    (a) $\overline{m} = (4,4)^T$, $\overline{p} = (-4,4)^T$. Solve the equation $\alpha\overline{m} + \beta\overline{p} = (5,9)^T$ for α and β !

    (b) $y = f(x) = 4 - 2x$.

        i. Where are the intersections of this line with the x and y axes?
        ii. What is the slope of this function?
        iii. Express x with y !
        iv. What is the f^{-1} inverse of the function f ?
        v. Plot f and f^{-1} together!

2. $((2+3)+(3+1+1))$ points)

    (a) Let $f(x) = 1.2 \cdot x - 5$. Find the fixed point of f!
    If $a_0 = 99$ and $a_{n+1} = f(a_n) = 1.2a_n - 5$, then how much is a_n ?

    (b) Let $a_n = \frac{2n+3}{4n+5}$. Is a_n increasing or decreasing? (Prove it!)
    Is a_n convergent as $n \to \infty$?
    If the answer is yes, what is the limit of a_n ?

3. $(3+(2+2+3))$ points)

    (a) Let $f(x) = 3x^2 + 4x$, $x_0 = 3$. What is the prediction of the linear approximation of f around x_0 for the value of $f(x_0 + \Delta x)$?

    (b)   i. Compute $(x^{-2}\cos(4x))'$!
          ii. Compute $(\sin(4x^3 + 3))'$!
          iii. Compute $\left(\sqrt[5]{3x^2} + \frac{4}{(3x)^6} + \ln(3x) \right)'$!

4. $(7+3$ points)

    (a) Study the monotonicity, convexity and the local extremal values of the function $f(x) = x - x^3$!
    Draw the graphs of f and f' in the same coordinate system!