MA1E01: Tutorial week 5

REMEMBER TO HAND BEFORE THE TUTORIAL STARTS

- Limits, continuity and sequences.

Problem 1 *Compute the following limits*

1. $\lim_{x\to 0^+} \frac{\sin x}{\sqrt{x}}$
2. $\lim_{x\to 0^-} \frac{\sin x}{\sqrt{x}}$
3. $\lim_{x\to 0} \frac{\sin x}{\sqrt{x}}$

Problem 2 *Compute the following limits*

1. $\lim_{x\to\infty} \frac{3x+1}{2x^2-2x-4}$
2. $\lim_{x\to\infty} \frac{3x^4+3x^2+4\sin x+2}{2x^4+3x^2-2}$
3. $\lim_{x\to\infty} \frac{3x^2+3x+4\sin(x^7)-3}{3x^2-2}$

Problem 3 *Is the function*

$$f(x) = \begin{cases} x\sin(1/x) & x \neq 0 \\ 0 & x = 0 \end{cases}$$

continous everywhere?

Problem 4 *Consider the sequence defined by the recursive relation*

$$a_n = a_{n-1} + a_{n-2}\,.$$

With $a_1 = 23$ *and* $a_2 = 122$. *Determine*

$$\lim_{n\to\infty} \frac{a_{n-1}}{a_n}\,.$$

How does the result depend on the initial condition(s) (a_1 *and* a_2*)*