First self-evaluation

Advanced level

September 2022

1. Functions:

   1.1. What is the definition of function?

   1.2. What is the minimum/maximum of a function? What does it mean for a function to be upper/lower bounded?

   1.3. Can you build an example of a lower-bounded function without a minimum? Or can you prove that one cannot exist?

2. Polynomials and linear functions:

   2.1. What is the definition of linear function? What is a polynomial?

   2.2. Describe (as formally as you can) the square-root function.

   2.3. What are the good candidates for the extremal point (either minimum or maximum) of $ax^2 + bx + c$? What about $ax^3 + bx^2 + cx + d$?

   2.4. Can you guarantee that the functions in 2.3. have a maximum/minimum? Why/why not?

3. Linear systems:

   3.1 Give an example of a system of 3 linear equations in 2 variables with at least one non-zero solution, or prove that it is not possible to do so.

   3.2 What is the relation between the dimension of the kernel of a matrix and the space of solutions of the linear system it represents?