

Genesis of some mistakes at mathematical analysis course

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In this report we shall consider the second year students' performance at the course of Selected topics of mathematical analysis at the Faculty of Mathematics and Informatics of Vilnius University.

Let us consider one example. Students had to draw the phase portrait of the nonlinear system of differential equations $x' = y + x - x^3, y' = -y$. This problem is quite well presented in Pyragas (2003) textbook. Students like such problems and they learned the procedure quite well:

- to find stationary points of the system,
- to linearize the system at stationary points,
- to find the eigenvalues of the matrices of linearized systems,
- to draw the local picture at each stationary point,
- to draw the global picture.

For me it was very surprising that many students failed solving quadratic equation – the characteristic equation of quadratic matrix. Then they made false conclusion about the character of the system at the stationary points and, of course, could not draw the global picture. It was more strange because students were aloud to have the A4 page with formulas. Here we shall try to investigate this problem and to answer to this question.

References

Pyragas K., 2003, Dinaminės sistemos. Vilnius: UAB Ciklonas.