

# NORDIC MATHEMATICAL TEAM CONTEST 2016

*A Challenge for University Students across the Nordic Countries*

*28th September – 2nd October*

## The Contest

- The NMTC is open to all Nordic undergraduate students, at most in their fifth year of study.
- Teams may consist of up to five students.
- Participation is free, but registration in advance is required.
- Problems are posted online at the opening of the contest.
- During five days, the team makes a collaborative effort to solve the problems.
- The team's joint solution is submitted online and will then be marked by the Jury.
- Full rules, along with old problem sets, may be found on the webpage.

## The Problems

- The contest comprises 10–12 problems, of varying levels of difficulty.
- Topics are usually chosen from algebra, linear algebra, univariate and multivariate calculus and probability theory.
- More advanced topics may occasionally occur, e.g. some abstract algebra, point-set topology, combinatorics, number theory and logic.
- Books and journal articles may be consulted and referred to in the solutions, but no external humans may be involved in the process.
- The use of computers is generally discouraged and is never strictly necessary to solve the problems. (A computer may be assigned to perform a long and tedious calculation, but the algorithm should be included in the solution and verifiable by a human.)

## Timeline

**Registration.** An email, containing the name, university and year of study of each team member, should be sent to the Jury Chairman Qimh Xantcha (qimh@math.su.se) no later than the **25th September**.

**Registration is required.**

**Problems.** The problems will be posted on the webpage at 12.00 CET on the **28th September**.

**Solutions.** Solutions (pdf-format is preferable) should be submitted to Qimh Xantcha no later than 23.59 CET on the **2nd October**.

**Results.** Ranking of the teams, including the names of the members of the three top-scoring teams, will be posted on the webpage within two weeks.

## Sample Problem 1 (2008)

- Does there exist a convex polyhedron (in  $\mathbf{R}^3$ ) with 5 vertices and 10 edges?
- Does there exist a convex polychoron (in  $\mathbf{R}^4$ ) with 6 vertices and 12 edges?

## Sample Problem 2 (2009)

Define  $a_n$  by the equation

$$2^2 \cdot 4^4 \cdot 6^6 \cdot \dots \cdot (2n)^{2n} = (na_n)^{n^2}.$$

Find the limit  $\lim_{n \rightarrow \infty} a_n$ .

## Sample Problem 3 (2010)

Wonder Island is inhabited by Hedgehogs. Each Hedgehog consists of three equal segments having a common endpoint, with all three angles between them equal to  $120^\circ$ . Given that all Hedgehogs are lying flat on the island and no two of them touch one another, prove that there is a countable number of Hedgehogs on Wonder Island.

## The Jury

- Dimitrios Askitis, Copenhagen University (dimitrios@math.ku.dk)
- Samuel Edwards, Uppsala University (samuel.edwards@math.uu.se)
- Freja Elbro, Copenhagen University (freja@math.ku.dk)
- Anne-Maria Ernvall-Hytönen, Åbo Akademi (aernvall@abo.fi)
- Eugenia Malinnikova, NTNU (eugenia.malinnikova@math.ntnu.no)
- Joni Teräväinen, Turku University (joni.p.teravainen@gmail.com)
- Qimh Richey Xantcha (chairman), Stockholm University (qimh@math.su.se)

We welcome new Jury members, especially representatives from Norway and Iceland. Preferably, you should be a Ph.D. student or post-doctor. You are encouraged to send us an email and tell us about your background.