

Round Robin Tournaments

Source: <http://sci.tech-archive.net/Archive/sci.math.num-analysis/2006-09/msg00316.html>

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 - *Date:* Mon, 25 Sep 2006 12:59:53 EDT
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Hello,
first of all, some definitions. In a round robin tournament each team plays each other team exactly one time. We have $2n$ teams. The tournament is organized in $2n-1$ rounds: in a round, each team plays exactly one match. Formally, if we denote by $1, \dots, 2n$ the teams, then the i -th round, $1 \leq i \leq 2n-1$, is the set of all the matches $R_i = \{ \{a_{i,1}, a_{i,2}\}, \dots, \{a_{i,2n-1}, a_{i,2n}\} \}$, where a_k is a permutation of $\{1, \dots, 2n\}$. A brilliant algorithm to schedule a round robin tournament is given at the page

http://www.nrich.maths.org/public/viewer.php?obj_id=1443&part=index&refpage=monthindex.php

(join the two lines to obtain the link).

(I) Given a round robin tournament R_i , $i=1, \dots, 2n-1$, can you extract a match from each round, such that every team appear at the most two times in the extracted matches? I suspect the following fact: there are two permutations s, t of $\{1, \dots, 2n-1\}$ such that, for every $1 \leq i < 2n-1$, you can extract the match $\{s_i, s_{i+1}\}$ from $R_t(i)$, and the match $\{s_{2n-1}, s_1\}$ from $R_t(2n-1)$. I have no proof for now.

(II) Suppose that we organize 2 round robin tournaments with the same $2n$ teams. We have $2*(2n-1)$ rounds. Can you extract a match from each round, such that every team appear at least one time and at the most four times in the extracted matches?

Thank you very very much for your ideas.

My Best Regards,

Maury

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