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SYNOPSIS

257 Contributor Profile: Christopher J. Bradley

258 Skoliad: No. 95 *Robert Bilinski*

- 5th Annual CNU Regional High School Mathematics Contest (2004)
- 5^e Concours Annuel CNU Régional de Mathématique du Secondaire (2004)
- Solutions to the 2005 Maritime Mathematics Competition

264 Mathematical Mayhem

264 Mayhem Problems: M251–M256

266 Mayhem Solutions: M201–M206

272 Problem of the Month *Ian VanderBurgh*

275 Pólya's Paragon: Playing Games with Mathematics (Part I) *John Grant McLoughlin*

277 The Olympiad Corner: No. 255 *R.E. Woodrow*

Featuring the Belarus Mathematical Olympiad 2003; problem to select the Indian IMO Team 2003; the German Mathematical Olympiad 2003; and readers' solutions to some of the problems from

- the Icelandic Mathematical Contest 2001–2002;
- the Greek Mathematical Competitions Selection Examination for the IMO 2002;
- the 16th China Mathematical Olympiad, Selected Problems;
- the XX Colombian Mathematical Olympiad, Higher Level;
- the 53rd Polish Mathematical Olympiad 2001–2002.

296 Book Reviews *John Grant McLoughlin*

296 *New Mexico Mathematics Contest Problem Book*

by Liong-Shin Hahn

Reviewed by Catherine Haines

297 *The Contest Problem Book VII: American Mathematics Competitions 1995–2000 Contests*

Compiled and augmented by Harold Reiter

Reviewed by John T. Siggers

298 Non-Transitivity in Tournaments

by Jerry Lo and David Rhee

A round-robin tournament, or tournament for short, is a competition in which each pair of players plays each other exactly once. Let the participants be represented by vertices. An arrow is drawn from vertex X to vertex Y if player X beats player Y .

Three vertices X , Y , and Z are said to form a transitive triple if, whenever X beats Y and Y beats Z , then X must beat Z . A tournament is said to be transitive if every triple is transitive.

Suppose X_i beats X_j in a transitive tournament with n players. By transitivity, X_i beats every player beaten by X_j . Thus, the players may be labelled X_1, X_2, \dots, X_n so that X_i beats X_j if and only if $i < j$. Hence, there is essentially only one transitive tournament for each fixed value of n .

In a non-transitive tournament, there must be some triple of vertices which is non-transitive. Such vertices form a directed 3-cycle. Hence, the number of such 3-cycles is a measure of how non-transitive a tournament is. This number is defined as the non-transitivity index λ of the tournament.

The authors prove that

Theorem. In a tournament with n players, let the number of wins of the i^{th} player be w_i . Then

$$\lambda = \frac{n(n-1)(2n-1)}{12} - \frac{1}{2} \sum_{i=1}^n w_i^2.$$

They then extend their ideas to a tournament where draws are allowed.

Enjoy!

303 Problems: 3126, 3135, 3149–3162

This month's "free sample" is:

3153. *Proposed by Michel Bataille, Rouen, France.*

For which integers n does the equation

$$\frac{3xy - 1}{x + y} = n$$

have a solution in integers x and y ?

.....

3153. *Proposé par Michel Bataille, Rouen, France.*

Pour quels entiers n l'équation

$$\frac{3xy - 1}{x + y} = n$$

a-t-elle des solutions entières x et y ?

309 Klamkin Solutions: KLAMKIN-01 to KLAMKIN-15

329 Solutions: 1150, 3044-3058