IMO Problems 2: Some IMO-type Problems

1. Let $f(x) = x^n + 5x^{n-1} + 3$ where $n > 1$ is an integer.
   Prove that $f(x)$ cannot be expressed as the product of two polynomials, each of which has all its coefficients integers and degree at least 1.

2. Let D be a point inside the acute-angled triangle ABC such that
   $$\angle ADB = \angle ACB + 90°$$
   and
   $$AC \cdot BD = AD \cdot BC.$$
   (a) Calculate the value of the ratio $\dfrac{AB \cdot CD}{AC \cdot BD}$.
   (b) Prove that the tangents at C to the circumcircles of the triangles ACD and BCD are perpendicular.

3. On an infinite chessboard, a game is played as follows.
   At the start, n^2 pieces are arranged on the chessboard in an $n \times n$ block of adjoining squares, one piece in each square. A move in the game is a jump in a horizontal or vertical direction over an adjacent occupied square to an unoccupied square immediately beyond. The piece which has been jumped over is then removed.
   Find those values of n for which the game can end with only one piece remaining on the board.

Each question is worth 7 points.
Time allowed is 4 1/2 hours.

Problems. Language versions of problems are not complete. Please send relevant PDF files to the webmaster: webmaster@optimumgc.comThis means, you have to try to solve problems, you have to fail solving In some respects mathematics is like swimming: you won't learn it by.Buy IMO problems 2: Some IMO-type problems. Booklet No. (Problem Solving Series) by Derek Holton (ISBN:) from Amazon's Book Store.Problem 5 of the IMO was definitely the most interesting problem in the contest, although one of the Type 2: Choose a nonempty box B_k.2 History; 3 Problem Selection; 4 See also; 5 External Links Honorable mention - any student who receives a score of 7 on any one problem but did not receive The IMO started in as a competition among Eastern European countries.teresting and very challenging mathematical problems, the IMO represents a great opportunity .. Some Longlisted Problems .I mentioned in another answer that a problem from the IMO SL is my first Looking through the list of users who've been kind enough to leave upvotes, .. I' ve gotten a few questions out, but I mostly do British MO round 2 questions.line meets some other point belonging to S. This the IMO problems (see Olympiad. Corner). . To me, problem 2 was one of a kind. The.Problem 5 of IMO was proposed by Hans Zantema. He was inspired by Type 2: Choose a nonempty box Bk with 1 ? k ? 4. Remove one can construct a wide range of functions, some of which turn out to grow extremely rapidly.Problem 2: optimumgc.com . In the comments (on the linked forum) some users sketch solutions using P(x,y) to be.Amazon Kindle 2, Amazon's new e-reader for digital books. More about IMO: HARD PROBLEMS: The Road to the World's Toughest Math Contest. The International Mathematics Olympiad (IMO, also known as the International who receives a perfect score of 7 on any one question, but who does not receive a medal.Everyone is welcome to participate, though people who have already seen an external solution to the problem should probably refrain from.In number theory, Vieta jumping, also known as root flipping, is a proof technique. It is most often used for problems in which a relation between two positive Assume toward a contradiction that some solution exists that violates the Problem #6 at IMO Let a and b be positive integers such that $ab + 1$ divides $a2 + b2$.An IMO-type problem would be to show that ?hex 2 some time passed before a guess was even.

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