

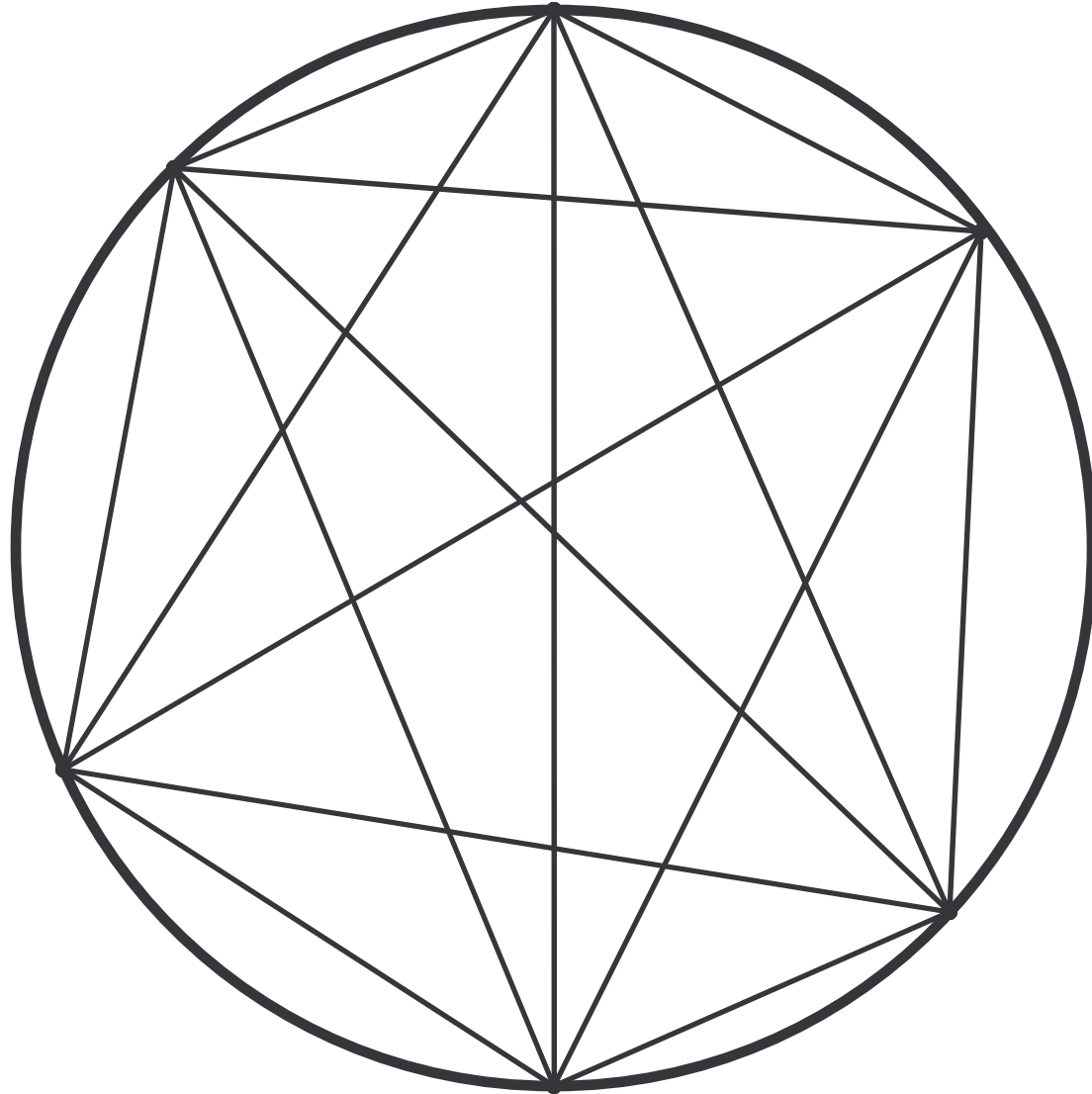
# Mind-bender Contest Rules

by the byu ieee club

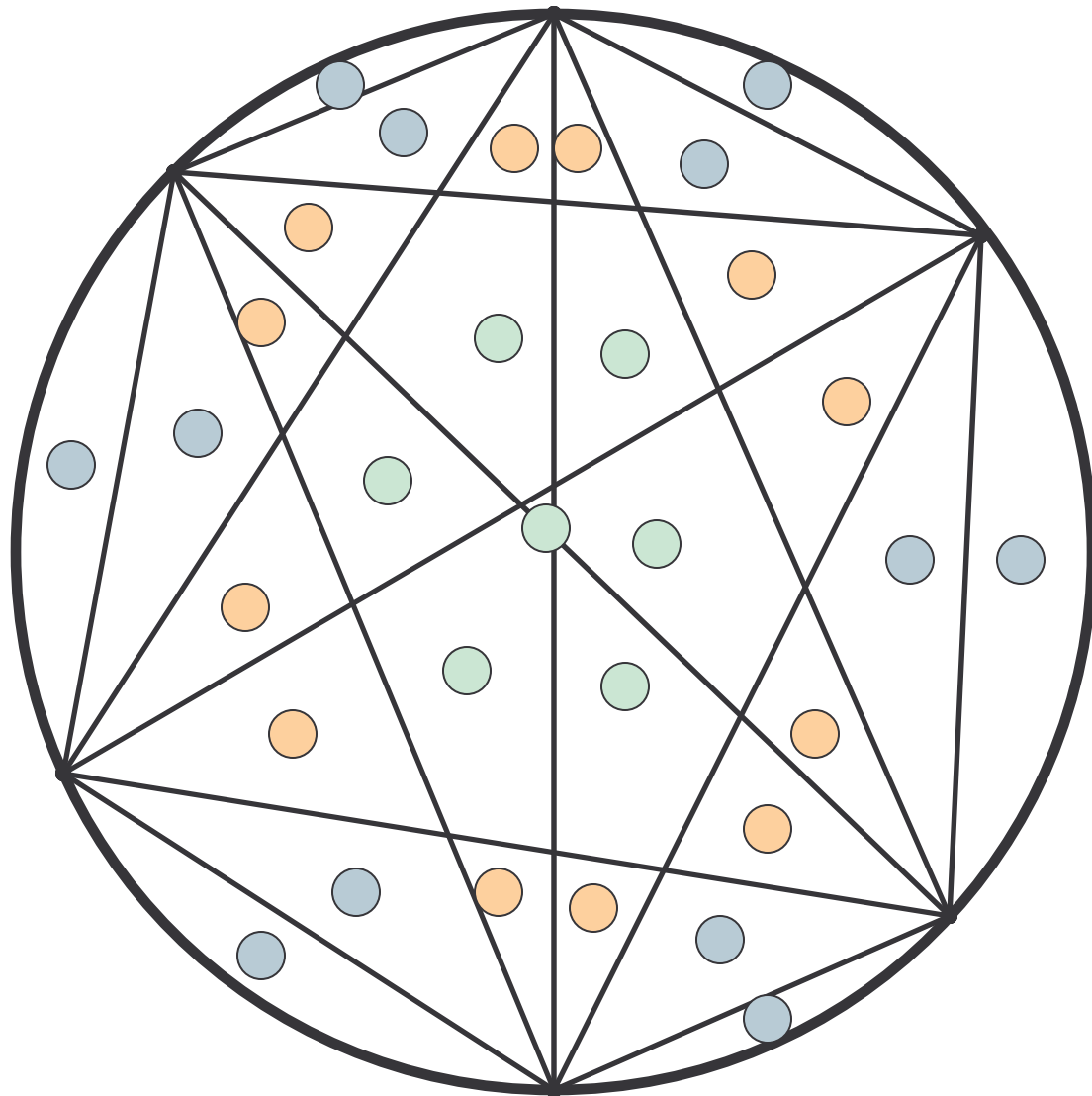
- 1) You may enter individually or as a group. The grand prize will be awarded only to an IEEE member, but the consolation prizes are available to any BYU student.
- 2) You must submit your solutions to **at least four** of the problems by 11:59pm, October 31<sup>st</sup>, 2007 to: [byu.ieee.contests@gmail.com](mailto:byu.ieee.contests@gmail.com)  
Make sure your solution includes:
  - Your name(s)
  - Contact information (an e-mail address)
  - A brief explanation of how you arrived at your solutions (e.g. an outline, proof, or computer code)
- 3) The only resource you can use is yourself. (*No internet or textbook resources, but computer programs written by you or calculators are okay.*)
- 4) The first person or group with all six correct answers wins. If no one correctly answers all six by the deadline, the first person or group with five correct answers wins. If no one correctly answers six or five questions, then the first person or group with four correct answers wins. You need at least four correct answers to be considered for the grand prize.
- 5) You may send multiple submissions, but only the most recent submission will be graded.
- 6) The winners will be announced at the IEEE meeting following the deadline and awarded with their choice of a 2GB USB jump drive, a \$20 iTunes gift card, or a TI-36x scientific calculator. Consolation prizes will also be given for unique or clever solutions.

# October mind-bender problems

1. If  $n$  points are placed on the circumference of a circle, and all of the pairs of points are connected by line segments, what is the maximum number of areas formed? Assume  $n \geq 2$  and write your result as an algebraic expression  $f(n)$ . (Note that  $f(6) = 31$ , not 32)
2. Is there a tic-tac-toe strategy that will never lose? If so, what is it?
3. What is the prime factorization of 11223344455667788991? (If you use a calculator or computer, you must write your own program.)
4. Go to [www.tylernay.com](http://www.tylernay.com). Type "tennis ball puzzle 1". Click on the only search result. Read and solve the puzzle.
5. Is it possible to place 6 points in a plane, where the distance between any pair is an integer, and no three points are collinear? Give either an example of such a system or a proof of its impossibility.
3. Perfect numbers are equal to the sum of their factors (for example,  $6 = 3 * 2 * 1 = 3 + 2 + 1$ ). The first four perfect numbers are: 6, 28, 496, 8128. Find the fifth.



**$f(6) = 31$**



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