The Thirty-First Annual
Eastern Shore High School Mathematics Competition

November 6, 2014

Team Contest Exam

Instructions

Answer as many questions as possible in the time provided. To receive full credit for a correct solution, show all work and provide a clearly written explanation. Solutions will be judged based on correctness, completeness and clarity. (Little credit, if any, will be given for a solution consisting of just a number or a single sentence.) Calculators are allowed **only** on the team contest exam.

All work and answers must be written on the provided sheets of plain white paper. Use only one side of each sheet of paper, and start each new problem on a new sheet of paper. Write your team name (that is, the name of the school which you are representing) at the top of each sheet that you turn in for scoring.

At the start of the team round, your team will receive a copy of only Problem 1. Your team must submit a response to Problem 1 within the rst 15 minutes of the team round time interval.

When you submit your response for Problem 1, you will receive a copy of Problem 2 and a copy of Problem 3. Your team will then have the time remaining in the team round to complete a response for each problem.

2. a. Provide justification that 541 is a prime number.

   b. Find a prime number larger than 541. Provide justification that the number is a prime number.

3. A **palindrome** is a number that is the same when written forwards or backwards. For example, 12321 is a palindrome.

   Find two 3-digit palindromes that are also prime numbers and differ by 10. Provide justification that each is a prime number.