Meg AIMO problems

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1 Introduction

1. (AIMO 2019/1) Gaston and Jordan are two budding chefs who unfortunately always misread the cooking time required for a recipe. For example, if the required cooking time is written 1:32 meaning 1 hour and 32 minutes, Jordan reads it as 132 minutes while Gaston reads it as 1:32 hours. For one particular recipe, the difference between Jordan's and Gastons misread time is exactly 90 minutes. What is the actually cooking time in minutes?

2. (AIMO 2014/3) Let x and y be positive integers that simultaneously satisfy the equations $xy = 2048$ and $\frac{x}{y} - \frac{y}{x} = 7.875$. Find x.

3. (AIMO 2022/5) There are 5 lily pads on a pond, arranged in a circle. A frog can only jump from each lily pad to an adjacent lily pad on either side. How many ways are there for the frog to start on one of these lily pads, make 11 jumps, and end up where it started.

4. (AIMO 2019/7) A triangle PQR is to be constructed so that the perpendicular of PQ cuts the side QR at N and the line PN splits the angle QPR into two angles, not necessarily of integer degrees, in the ratio 1:22. If $\angle QPR = p$ degrees, where p is an integer, find the maximum value of p.

5. (AIMO 2018/9) Prove that 38 is the largest even integer that is *not* the sum of two positive odd composite numbers.