Problem Solving Session

Be prepared to discuss the following problems in class on Thursday, **September 26**.

1. Given a point (a, b) with $0 < b < a$, determine the minimum perimeter of a triangle with one vertex at (a, b), one on the x-axis, and one on the line $y = x$. You may assume that a triangle of minimum perimeter exists.

2. How many subsets of the set $\{1, 2, 3, \ldots, 30\}$ have the property that the sum of elements of the subset is greater than 232?

3. Consider the following two operations on a string of six numbers: (The letters A-F stand for any numbers.)

$$ABCDEF \mapsto FABCDE \quad \text{and} \quad ABCDEF \mapsto AECDBF.$$

For example, the string 284736 could go to either 628473 or to 234786. How many different strings is it possible to get, starting with the string 123456 and performing these two operations in any order, as often as you like? Prove that your answer is correct.