1. Find all positive three-digit integers \( n \) such that if \( s \) is the sum of its digits, all digits of the number \( n + s \) are equal, and all digits of \( n - s \) are also equal (but possibly distinct from the digits of \( n + s \)).

2. A collection of 2023 real numbers has the property that its mean, median, and range all equal 2023. What is the greatest possible value of its maximum?

   (If the numbers are, in order, \( a_1 \geq a_2 \geq \cdots \geq a_{2023} \), the mean is \( \frac{1}{2023}(a_1 + \cdots + a_{2023}) \), the median is \( a_{1012} \), and the range is \( a_1 - a_{2023} \)).

3. Let \( W_1 \) and \( W_2 \) be disjoint circles with radii \( r_1 \) and \( r_2 \), respectively. (\( Disjoint \) means that \( W_1 \) and \( W_2 \) are not allowed to intersect, or to be tangent.) Show that there are two distinct concentric circles that are each tangent to both \( W_1 \) and \( W_2 \) if and only if \( r_1 = r_2 \).

4. We have a collection of 2023 squares of various sizes and of total area 4. Show that we can use this collection to fully cover a unit square (overlaps are allowed).

5. (This problem concerns the same game as Problem 5 from the previous problem set.)

   Two players, Angelica and Brian, each have a rectangular 20 \( \times \) 21 board and 140 identical 1 \( \times \) 3 tiles (‘straight trominos’), enough to completely cover their board with no overlaps.

   First, Angelica covers her board with her tiles (with no overlaps), and then Brian looks at what she did and covers his board with his tiles. Angelica gets a point for each tile that is in exactly the same position in the two tilings. Show that Brian has a strategy such that Angelica gets at most 14 points for every one of Angelica’s tilings.