This is an in-class group assignment. Pick a solver for your group; the remaining members will play the role of listeners.

Follow the Solver/Listener paradigm to analyze and attempt to solve the given problem. It is important that you manage the discussions in a disciplined manner so that your group can take adequate notes to prepare a transcript of your session.

After the class, and by the announced deadline, prepare a written presentation of your session, including the interactions between the solver and the listener(s) and a detailed explanation of how you arrived at your solution. You may include diagrams and mathematical work if you used those as part of your process.

One group member should submit that to the Curator System via the collection point for ICE01.

Remember that the evaluation of your solution will depend primarily on the completeness and clarity of your explanation.

Problem 1

In a room there are 10 people, none of whom is younger than 1 year of age nor older than 60 years of age.

Prove: It must be possible to find two groups of people in the room (not overlapping, perhaps not including all 10 people), such that the sum of the ages in both groups is the same.

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Problem 2

Several arcs of a circle are colored blue. The sum of the lengths of those arcs is less than 1/4 of the circumference of the circle.

Prove: It is possible to draw a rectangle whose corners all lie on the circle so that none of the corners of the rectangle are colored blue.

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Problem 3

In a square ABCD with sides of length 1, someone has drawn a number of circles. The sum of the radii of the circles is 0.6. The circles might intersect or even coincide, but they do not extend outside the square.

Prove: There is a line parallel to AB having common points with at least two of the circles.

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Problem 4

In a rectangle with sides 20 and 25 someone has drawn 120 unit squares.

Prove: It is possible to place in this rectangle a circle with diameter 1 so that the circle does not intersect with any of the squares.

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Problem 5

In a square with side 1 there are 101 marked points such that no three of them lie on the same line.

Prove: There exists a triangle with three marked points as vertices whose area is less than 1/100.