There are four questions to answer.

**Question 1.** Find a closed formula for the sum

\[ \sum_{i=1}^{n} \binom{n}{i} 4^i. \]

Hint: Use the binomial formula.

**Question 2.** Draw a set of points in general position which is maximal and doesn’t contain a 4-cap or a 5-cup.

**Question 3.** Given a set of 2n points, P, in the plane in general position. The pointset P has exactly n halving pairs.

- Show that any line which contains a halving pair intersects every other halving segment.
- Use the previous result to show that any two halving segments intersect each other.

**Question 4.**

- Draw seven points in general position without a convex pentagon.
- Draw seven points in general position without a convex pentagon with the following property. Any other point of the plane is either on a line with two or in convex position with four points out of the seven.

Due date: April 6, in class.