

**CIS 3362 Homework #5c**  
**Due: 11/12/2014 at the beginning of class**

1) For each prime in between 20 and 1000, pick a random  $a$  and  $b$  and create the corresponding elliptic curve. For each elliptic curve, calculate the number of points on that curve, including the point  $O$ . Make a graph of your data with the  $x$ -axis being the prime number and the  $y$ -axis being the number of points. Answer the following questions:

a) What pattern(s) do you see in this graph?

b) What points were the “biggest outliers”?

c) What, if any, conclusions do you think can be drawn about the relationship between the prime  $p$  and the corresponding number of points on the elliptic curve.

2) This time, pick five different primes in between 500 and 1000. For each prime, generate 100 valid pairs of  $a$  and  $b$  to generate an elliptic curve. For each curve you generate, determine the number of points on it. Grouping your data by each prime, collect the following statistics about the number of points:

1. average

2. standard deviation

3. minimum

4. maximum

5. mode

a) What pattern(s) do you see in this data?

b) What, if any, conclusions can you draw about the variation of points in an elliptic curve when the prime number chosen is fixed?