CS70 Polynomials

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Overview

Polynomials

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- **Property 2:** A polynomial of degree d is **uniquely** determined by $d + 1$ distinct points.

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$$p_3(x) = 1 \text{ at } x_3 \text{ and } p_3(x) = 0 \text{ at } x_1, x_2, x_4, \ldots, x_{d+1} \text{ and so on...}$$

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- Similarly for $p_i(x)$, we have $p_i(x) = \frac{q_i(x)}{q_i(x_i)}$.

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- However, if we work with numbers modulo m where m is a prime number, then we can add, subtract, multiply and divide.
- Then **Property 1** and **Property 2** hold if the coefficients and the variable x are restricted to take on values modulo m. When we work with numbers modulo m, we are working over a **finite field**, denoted by $GF(m)$ (**Galois Field**).

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- Then in order to know what s is, at least k of the n people must work together so that they can perform **Lagrange interpolation** and find P.
- If there are less than k people, they will learn nothing about s!

Problem Time!