Toric geometry and mirror symmetry

- Motivation: `see' high-dimensional (Kaehler) geometry from combinatorics of polytopes.
- A good starting point to learn Kaehler and algebraic geometry
- Can do a lot of experiments!

\[ \mathbb{CP}^n \quad \xrightarrow{\text{eq.}} \quad \mathbb{C}^n \times \mathbb{C}^n \]

- Toric fib. (torus action, torus fibers inside)
- Divisors & lin. equiv. (toric)

- Introduction to cycles.
- Sections of \( \mathbb{X}(k) \), lattice points of \( \mathcal{D} \).

- Holomorphic curve \( (\Sigma \to \mathbb{X}) \) \( \xrightarrow{\text{torical curves in } \mathbb{P}^2 \subset \mathcal{D}} \)
- Holomorphic discs \( (\mathbb{D} \to (\mathbb{X},\mathbb{T})) \) \( \xrightarrow{\text{torical discs}} \)

Tropical geometry is originated from computer science!

\[ GW, SYZ, \text{mirror symmetry} \]

- More complicated geometry can be studied by Leftschetz hyperplane theorem, toric degeneration, or Okounkov body.
- There will be many examples. We will illustrate using one example, and the concepts and methods easily extend to general case.
- We can have a sense of many classical and modern aspects of algebraic geometry.
- We will skip many proofs, but instead giving the ideas of proof or a way of convincing ourselves.
- There will be a simple assignment after each class; you should turn in on the next Tuesday. NO FINAL EXAM. You may be asked to give a presentation on an example in the last week.