# RIEMANN SURFACE
# HOMEWORK 11

DUE: TUESDAY, MAY 31

(1) The complex projective space $\mathbb{CP}^n$ is the space of all complex lines in $\mathbb{C}^{n+1}$. In other words,

$$\mathbb{CP}^n = \frac{\mathbb{C}^{n+1}\backslash\{0\}}{(U_0, U_1, \ldots, U_n) \sim (\lambda U_0, \lambda U_1, \ldots, \lambda U_n) \quad \text{for } \lambda \in \mathbb{C}\backslash\{0\}} \, .$$

Note that $\mathbb{CP}^1$ is the Riemann sphere $\hat{\mathbb{C}}$. Prove that the $n$-th symmetric product of $\hat{\mathbb{C}}$ is $\mathbb{CP}^n$.

Hint: $n$-points in $\hat{\mathbb{C}}$ can be thought as zeros of a polynomial of degree less than or equal to $n$.