MATH 595 TV
Spring 2023
Homework 3, for Thursday, February 23 problem session

1. Consider the affine toric variety U_σ, where σ is the cone generated by
   $\{v_1 = (1,0,1),\ v_2 = (0,1,1),\ v_3 = (-1,0,1), v_4 = (0,-1,1)\} \subset N = \mathbb{Z}^3$.

   (a) Write $U_\sigma = \mathrm{Spec}[\chi^{m_1}, \chi^{m_2}, \ldots, \chi^{m_r}]$ for an appropriate $m_1, \ldots, m_r \in M$.

   (b) Identify all faces τ of σ.

   (c) For each τ, identify $x_\tau \in U_\sigma$ by computing the value of each χ^{m_j}, $j = 1, \ldots, r$ at x_τ, where χ^{m_j} is interpreted as a regular function on U_σ.

   (d) Let $n = (1,1,2) \in N$. Does $\lim_{t \to 0} \psi_n(t)$ exist in U_σ? If so, what is the limit?

2. Page 61 [F], first exercise on page

3. Page 167 [CLS], Exercise 4.0.10

4. Page 174 [CLS], Exercise 4.1.4

5. Page 70 [F], third exercise on page