MATH 216B HOMEWORK 3

SPRING 2004

(1) Let $\sigma = \text{pos}((1,0,0),(1,2,0),(1,1,2),(1,0,2))$. Which Weil divisors on U_σ are Cartier? Compute Pic and A_2 for this toric variety.
(2) Give two examples to show that if X_Δ is not smooth, then A_{n-1} may have torsion, but also could still be torsion-free. What is the criterion for A_{n-1} to be torsion-free?
(3) Recall that if X_Δ is a smooth toric variety, to blow-up the distinguished point x_τ on X_Δ we take the stellar subdivision of τ (by adding the ray $\sum_{v_i \in \tau} v_i$). What does the blow-up do to A_{n-1}?
(4) Show that any two-dimension complete toric surface is projective. Bonus: Check that every ample divisor on such a variety is very ample.
(5) Let Δ be the fan with rays $\{(3,-1,1),(0,1,0),(0,0,1),(-1,0,0),(1,0,0)\}$ and cones $\{124,125,134,135,234,235\}$. Give an explicit description of the ample cone of X_Δ.