1. For any positive integer \( r \), let \( T_r = \text{conv}\{ (0,0,0), (1,0,0), (0,1,0), (1,1,r) \} \subseteq \mathbb{R}^3 \).
   Compute the Ehrhart series and Ehrhart polynomial of \( T_r \). In particular, show that the Ehrhart polynomial of \( T_r \) has a negative coefficient for \( r \) sufficiently large.

2. Recall that a lattice polytope \( P \subseteq \mathbb{R}^n \) containing 0 in its interior is called reflexive if \( P^\Delta \subseteq (\mathbb{R}^n)^* \) is also a lattice polytope. (See HW 5 #3.)
   (a) Show that if \( P \subseteq \mathbb{R}^2 \) is a lattice polygon such that 0 is the unique lattice point in its interior, then \( P \) is reflexive.
   (b) Show that if \( P \) is reflexive and \( k \) is a positive integer, then the lattice points in the interior of \( kP \) are exactly the lattice points in \((k-1)P\).
   (c) What does part (b) imply about the \( h^* \)-vector of \( P \)?

3. Let \( P \subseteq Q \) be \( n \)-dimensional lattice polytopes in \( \mathbb{R}^n \). Prove that \( h^*_P \leq h^*_Q \), where \( \leq \) is taken coordinatewise.

4. Let \( P \subseteq \mathbb{R}^3 \) be the pyramid with vertices \((0,0,0), (100,0,0), (0,200,0), (100,200,0), \) and \((0,0,100)\). Use Brion’s theorem to find the lattice point generating function \( G_P(t_1,t_2,t_3) \).