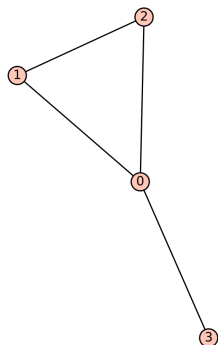


Last name _____

First name _____

LARSON—OPER 731—HOMEWORK WORKSHEET 06
Faces, Facets and Extreme Points



The Vertex Packing Linear Program (VPLP) here is:

maximize: $z = x_0 + x_1 + x_2 + x_3$

$$\begin{array}{rcll} & x_0 & + & x_1 & \leq & 1 \\ \text{subject to:} & x_0 & & & + & x_2 & \leq & 1 \\ & & x_1 & + & x_2 & & \leq & 1 \\ & x_0 & + & & & & + & x_3 & \leq & 1 \\ & 0 \leq x_i \leq 1 & \text{for } i \in \{0, 1, 2, 3\}. \end{array}$$

Consider the polytope \mathcal{P} defined by these 12 inequalities. Note that there are as many as 2^{12} faces. Some of these will define facets and extreme points of \mathcal{P} .

1. Find the dimension of \mathcal{P} .
2. Find all of the facets of \mathcal{P} . Argue why you have them all.
3. Find all of the extreme points of \mathcal{P} . Argue why you have them all.