

Last name _____

First name _____

LARSON—OPER 731—CLASSROOM WORKSHEET 14
Faces, Facets, Extreme Points and Minkowski's Theorem

Faces & Facets

1. What is a *face* of a polytope?

2. What is a *facet* of a polytope?

3. What is an *extreme point* of a polytope?

4. Find any faces in the polytope defined by the linear inequalities ($x \in \mathbb{R}$), and find their dimensions. Identify facets and extreme points.

$$x_1 + x_2 \leq 1$$

$$x_1 \geq 0$$

$$x_2 \geq 0.$$

5. Find any faces in the polytope defined by the linear inequalities ($x \in \mathbb{R}$), and find their dimensions. Identify facets and extreme points.

$$3x_1 + x_2 \leq 3$$

$$x_1 + 3x_2 \leq 3$$

$$x_i \geq 0.$$

6. Find any faces in the polytope defined by the linear inequalities ($x \in \mathbb{R}, x_i \geq 0$), and find their dimensions. Identify facets and extreme points.

$$x_0 + x_1 \leq 1$$

$$x_0 + x_2 \leq 1$$

$$x_1 + x_2 \leq 1$$

7. Find any faces in the polytope defined by the linear inequalities ($x \in \mathbb{R}, x_i \geq 0$), and find their dimensions. Identify facets and extreme points.

$$x_0 + x_1 \leq 1$$

$$x_0 + x_2 \leq 1$$

$$x_1 + x_2 \leq 1$$

$$x_0 + x_3 \leq 1$$

$$x_1 + x_3 \leq 1$$