

MATH 326: HOMEWORK 5
SPRING 2013

1. Prove that every polyhedral set is convex.
2. Prove the following: Let $C \in \mathbb{R}^n$ be a convex cone and let $x_1, x_2 \in C$. If $\alpha, \beta \in \mathbb{R}$ and $\alpha, \beta \geq 0$, then $\alpha x_1 + \beta x_2 \in C$. [Hint: Use the definition of convex cone and the definition of convexity with $\lambda = 1/2$, then multiply by 2.]
3. Consider the polyhedral set P defined by the linear inequalities:

$$3x_1 + x_2 \geq 11$$

$$x_1 + x_2 \geq 5$$

$$x_1 \geq 3$$

$$x_1 \geq 0$$

$$x_2 \geq 0$$

Identify all the extreme points in the polyhedral set. Identify any degenerate extreme points.