Math 131, Fall 18
Discussion Section Worksheet 1

We will use the following notation:

- $\mathbb{N}$ denotes the set of natural numbers: $\{1, 2, 3, \ldots\}$
- $\mathbb{Z}$ denotes the set of integers: $\{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$.

1. Consider the following sets and express them in the form $\{x_1, \ldots, x_n\}$.
   (a) $\{x \in \mathbb{Z} \mid x^2 < 25\} =$

   (b) $\{x \in \mathbb{N} \mid x^2 < 25\} =$

2. Express the following sets using 'set building notation':
   (a) $\{1, 4, 9, 16, 25, ...\}$

   (b) The set of all odd integers.

3. Sketch to following sets of points in the plane:
   (a) $\{(x-1, x^2) \in \mathbb{R}^2 \mid x \in \mathbb{Z} \text{ and } -2 \leq x \leq 3\}$

   (b) $\{(x, y) \in \mathbb{R}^2 | x = 2y\}$

(c) $\{(x,y) \in \mathbb{R}^2 | x \geq 0 \text{ and } y \geq 0\}$

4. Recall that $\mathbb{F}$ denotes either $\mathbb{R}$ or $\mathbb{C}$ and that:

$$\mathbb{F}^n = \{(x_1, \ldots, x_n) | x_j \in \mathbb{F} \;\text{ for }\; j = 1, \ldots, n\}.$$

Prove that if $x, y \in \mathbb{F}^n$, then $x + y = y + x$.

Proof.

$\square$

5. Prove that $\lambda(x+y) = \lambda x + \lambda y$ for all $x, y \in \mathbb{F}^n$ and $\lambda \in \mathbb{F}$.

Proof.

$\square$