Mathematics 300

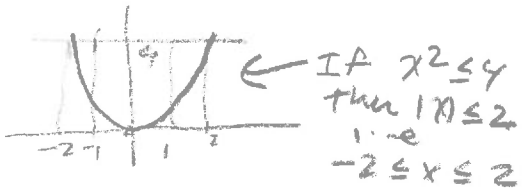
Quiz 2 Name: Key

***You must show your work to get full credit.***

**1.** List the elements of $S = \{x \in \mathbb{Z} : x^2 \leq 4\}$ between brackets.

For $x \in S$ we know $x^2 \leq 4$. Thus $|x| \leq 2$. So $x$ is one of the integers $-2, -1, 0, 1, 2$.

$S =$ $\{-2, -1, 0, 1, 2\}$




IF $x^2 \leq 4$ then $|x| \leq 2$ i.e $-2 \leq x \leq 2$

**2.** What can we say about $a$ if $|\{1, 2, 3, a\}| = 3$?

This can only happen if $a = 1$ or $a = 2$ or $a = 3$.
I.e $a \in \{1, 2, 3\}$.

**3.** Let $X = \{1, 2, 3, 4\}$. List the elements of the set $\{A : A \subseteq X \text{ and } |X| = 2\}$.

$\{\{1,2\}, \{1,3\}, \{1,4\}, \{2,3\}, \{2,4\}, \{3,4\}\}$

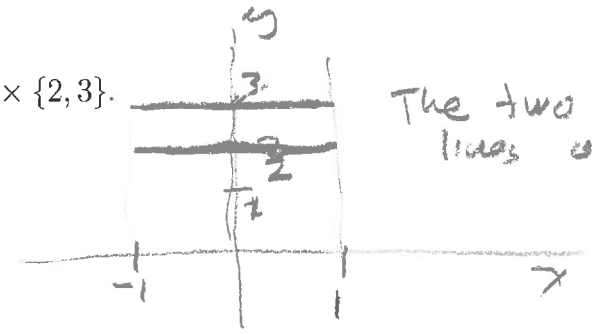
**4.** True or False: $\{x \in \mathbb{R} : x - 1 = 0\} \subseteq \{y \in \mathbb{R} : y^2 - 1 = 0\}$. Explain your answer.

$x - 1 = 0$ is the same as $x = 1$ so $\{x \in \mathbb{R} : x - 1 = 0\} = \{1\}$
$y^2 - 1 = 0$ is the same as $y = 1$ or $y = -1$ so
$\{y \in \mathbb{R} : y^2 - 1 = 0\} = \{1, -1\}$. And $\{1\} \subseteq \{1, -1\}$ True

**5.** Let $A = \{1, 2\}$ and $B = \{x, y\}$. List the elements of $A \times B$ between brackets.

$A \times B =$ $\{(1, x), (1, y), (2, x), (2, y)\}$.

**6.** Draw a picture of the set $[-1, 1] \times \{2, 3\}$.




The two darkened lines are the picture.