

MATH 323 Section 2

QUIZ 3

February 11th, 2013

Your Name: _____

Let A and B be the following sets:

$$A = \{x \in \mathbb{R} : x^2 \leq 4\}$$

$$B = \{y \in \mathbb{R} : y > 2\}.$$

Explain how one would prove the following facts (you do not need to actually prove them):

- a) A and B are disjoint.
- b) $A \cup B = \{z \in \mathbb{R} : z \geq -2\}$.

Answers:

a) We need to show that $A \cap B = \emptyset$. We can do this one of two ways (but don't need both!):

Solution 1: Show $x \in A$ implies $x \notin B$. We assume x satisfies $x^2 \leq 4$ and show that $x \leq 2$.

Solution 2: Show $x \in B$ implies $x \notin A$. We assume $x > 2$ and show that $x^2 > 4$.

(Note: the second is a little better since assuming $x > 2$ seems much easier to work with than assuming $x^2 \leq 4$.)

b) We need to show two things:

First we show $A \cup B \subseteq \{z \in \mathbb{R} : z \geq -2\}$. We take x such that $x^2 \leq 4$ or $x > 2$ and show that $x \geq -2$. Next we show that $\{z \in \mathbb{R} : z \geq -2\} \subseteq A \cup B$. We take a $z \geq -2$ and show that either $z^2 \leq 4$ or $z > 2$.