Mathematics 300

Quiz 23 Name: Key

You must show your work to get full credit.

1. Show that there exist integers a and b such that $a^2 + b^2 = 10$.

Let $a=3$ and $b=1$, then

$a^2+b^2 = 3^2+1^2 = 9+1 = 10$.

This show there exist integers a and b with $a^2+b^2=10$.

2. Let $A = \{x \in \mathbb{Z} : 30 \mid x\}$ and $B = \{x \in \mathbb{Z} : 5 \mid x\}$. Show $A \subseteq B$.

Let $x \in A$. Then $30 \mid x$. Thus $x = 30k$ for some integer k. Whence

$x = 30k = 5(6k) = 5n$

where $n = 6k \in \mathbb{Z}$. Thus $5 \mid x$. Thus $x \in B$

So if $x \in A$, then $x \in B$. That is $A \subseteq B$.

3. With A and B as in the last problem show that $A \neq B$.

Let $x = 10$. Then $5 \mid x$, but $30 \nmid x$. So $x \in B$ but $x \notin A$. So $A \neq B$.