Name Mr. Key Seat ________

MathSci 119 sec.1

Jan 28, 2005

1. (2 points) Disprove: Let a and b be integers. If $a|b$ and $b|a$ then $a = b$.

Let $a=3$ and let $b=-3$. Since $3=(-3)(-1)$ the definition of divisible tells us that $-3|3$. Similarly, since $-3=(3)(-1)$ we have $3|-3$. Yet $3 \neq -3$.

2. (3 points) Show that the sum of an even integer and an odd integer is odd.

We will show that the sum of an even integer a and an odd integer b is even. Let a and b be even integers. By definition of even $2|a$ and $2|b$. By definition of divisible there are integers x and y with $a=2x$ and $b=2y$. Observe that $a+b=2x+2y=2(x+y)$. Therefore there is an integer c, namely $x+y$, with $a+b=2c$. Hence $2|a+b$ and so $a+b$ is even.

(OVER)

3. (3 points) Let a, b and c be integers. Show that if $a|b$ and $a|c$ then $a|(b+c)$.

Let a, b and c be integers. Assume $a|b$ and $a|c$. By definition of divisible there are integers x and y with $b = ax$ and ~~Observe that~~ $c = ay$. Observe that $b + c = ax + ay = a(x+y)$. Hence there is an integer d, namely $x+y$ with $b+c = ad$. Therefore by definition of divisible $a|(b+c)$.