Homework 4 [Due 9/29]

Problem 1	. Fill in the addition	and multiplication	table for the	"modulo 5 arithmeti	c": In both ta	bles, for the a	a and b give	n, find
$c \in \{0, 1, 2\}$	$,3,4$ } such that							

$$a+b \equiv c \pmod{m}$$

 $a \times b \equiv c \pmod{m}$

respectively.



	×	0	1	2	3	4
•	0					
	1					
	2					
•	3					
	4					

Problem 2. Find an integer x such that

$$x \equiv 1 \pmod{3}$$
$$x \equiv 3 \pmod{5}.$$

Problem 3. Prove that for two positive integers a and b, if a|b and b|a than a=b.

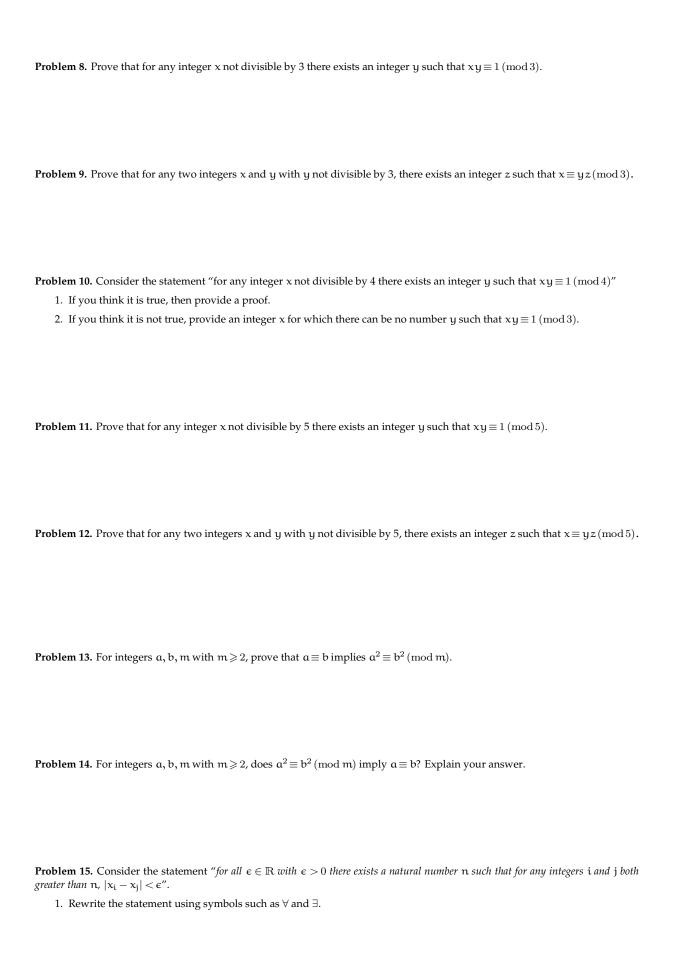
Problem 4. Let n be an integer. Prove that if $3|n^2$, then 3|n.

Problem 5. For integers a,b,c,m with $m\geqslant 2$, prove that $a\equiv b\ (\mathrm{mod}\ m)$ implies $ac\equiv bc\ (\mathrm{mod}\ m)$.

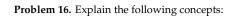
Problem 6. Find integers a, b, c such that $ac \equiv bc \pmod{4}$ but $a \not\equiv b \pmod{4}$.

Problem 7. For integers a, b, c, m with $m \geqslant 2$, if $ac \equiv bc \pmod{m}$, can we "cancel" the c from both sides and conclude that $a \equiv b \pmod{m}$?

- 1. If you think we can do that, provide a proof.
- 2. If you think we cannot do that, explain why.



2. Write down the negation of the statement using symbols.
3. Write down the negation of the statement in English.



- 1. Proper subset
- 2. Power set
- 3. Relative complement
- 4. Partition of a set
- 5. Cartesian product of two sets