
Math 218: Elementary Number Theory

HOMEWORK 1 : DUE AUGUST 31

§1.1 #6. Prove for every non-zero integer a that $a \mid \pm a$.

§1.1 # 8. Let $a, b, m,$ and $n \in \mathbb{Z}$. Prove that if $a \mid m$ and $b \mid n$ that $ab \mid mn$.

§1.1 # 9. Prove that if there exist integers x and y such that $9x + 12y = n$ then $3 \mid n$.

§1.1 #10. Let $a, b, c,$ and $d \in \mathbb{Z}$ and assume $a + b = c$.

(a) Prove that if d divides any two of the integers $a, b,$ and c , then d divides all three of them. (We will use this result frequently throughout the semester.)

(b) Use (a) to prove that if $d \mid c$ then d divides both a and b or d divides neither a nor b .

(c) Give examples to show that both situations in (b) do occur.

§1.1 #11. If an integer a divides $12n + 5$ and $4n + 2$ for some $n \in \mathbb{Z}$, prove that $a = \pm 1$.