

Math 215: Introduction to Advanced Mathematics
Problem Set 2

Due Friday September 13

Do pg. 53: 5

1) Consider the following statements about the real numbers \mathbb{R} . For each statement i) state the negation, ii) decide if the original statement is true, iii) state the converse and iv) decide if the converse is true. Justify your answers.

a) If both $3 \cdot 2 = 6$ and $4 + 4 = 8$, then $5^2 = 20$.

b) If both $3 \cdot 2 = 6$ and $4 + 4 = 11$, then $5^2 = 25$.

2) Suppose G is a group with the additional property that if $a, b, c \in G$ and $a * b = c * a$, then $b = c$. Prove that G is commutative, i.e., prove that $a * b = b * a$ for all $a, b \in G$.

3) Prove that $ab > 0$ if and only if

$$[(a > 0 \text{ and } b > 0) \text{ or } (a < 0 \text{ and } b < 0)].$$