Activity 17 – Introduction to Proof

disproofs

Prove the statements that are true and disprove the ones that are false.

(1) $\forall\, x, y \in \mathbb{R},\ (x \notin \mathbb{Q} \wedge y \notin \mathbb{Q}) \implies xy \notin \mathbb{Q}$.

(2) $\forall\, x, y \in \mathbb{Z},\ (x$ is odd $\wedge\ y$ is odd $) \implies xy$ is odd

(3) For all integers a, b, and c, if $a \nmid b$ and $a \nmid c$ then $a \nmid b + c$.

(4) For all integers a, b, and c, if $a \nmid b$ and $a \nmid c$ then $a \nmid bc$.

(5) $\forall\, x, y \in \mathbb{R},\ \lfloor x \rfloor \cdot \lceil y \rceil = \lceil x \rceil \cdot \lfloor y \rfloor$.

(6) $\forall\, a, b, c \in \mathbb{Z},\ a \mid b \implies a \mid bc$.

(7) $\forall\, m, n \in \mathbb{Z},\ n \mid m^2 \implies n \mid m$.

(8) If the quadratic equation $ax^2 + bx + c = 0$ has two real solutions (where a, b and c are real) then $ac < 0$.