Quiz 1   MAD 2104   Summer A 2014

This is a take-home quiz due Monday, May 19. Work should be shown for full credit.

1. (10 pts) In each case, prove or disprove. To disprove, it is enough to give a counterexample. (Note that while a Venn diagram helps, it is not a substitute to a proof or a concrete counterexample.)

   (a) $A \setminus (B \setminus C) = (A \setminus B) \setminus C,$ for all sets A, B, C .

(b) $(A \cup B) \times C = (A \times C) \cup (B \times C),$ for all sets A, B, C .

2. (8 pts) Consider the set $A = \{a, b, c, d\}$. In each case, give an example of a relation $\mathcal{R}$ on A satisfying the conditions. Just give the example, no further justification is needed.

(a) $\mathcal{R}$ is reflexive, symmetric, but not transitive.

(b) $\mathcal{R}$ is reflexive, transitive, but not symmetric and not anti-symmetric.

3. (8 pts) Find a concrete formula for a bijective function between the set of all natural numbers and the set of natural numbers congruent to 2 mod 5. Show that the function you found is indeed bijective.