CSci 1302 Assignment 9

Due Wedn., November 23rd

Problem 1 (20 points). Exercises 9, 13, 14, 24, 29, 33 pp. 281-282.
Use the proof methods that we used in class, NOT the element argument given in the textbook.

Problem 2 (2 point). Using definition of a cross-product of two sets $A \times B = \{(a, b) \mid a \in A \land b \in B\}$, where (a, b) is an ordered pair, prove the property given in the following exercise: 17 p. 281. Hint: you need to use idempotence property of $\land$. IT may also be easier to transform the right-hand side of the equality into the left-hand side than the other way around.

Problem 3 (4 points). Consider the following sets (where $U = \mathbb{N}$):

- $A = \{n \in \mathbb{N} \mid \exists k.n = k^2\}$
- $B = \{n \in \mathbb{N} \mid \exists k.n = k^4\}$
- $C = \{n \in \mathbb{N} \mid even(n)\}$

Compute the following sets. **Important:** Justify your answers using propositional logic.

1. $A \cup B$
2. $C^C \cap A$

Problem 4 (5 points). Exercises 10 b,c, 19 c,e,f.

Problem 5 (3 points). Exercises 20, 22 p. 593 (also check the anti-symmetric property).

Problem 6 (8 points). Please classify the following relations on natural numbers $\mathbb{N}$ as:
reflexive/non-reflexive,
symmetric/anti-symmetric/neither symmetric nor anti-symmetric, and
transitive/non-transitive.

1. $R = \{(n, m) \mid n + m \text{ is even}\}$
2. $R = \{(n, m) \mid n + m \text{ is odd}\}$
3. $R = \{(n, m) \mid n \text{ is even}, m \text{ is even}\}$
4. $R = \{(n, m) \mid n \text{ is even}, m \text{ is odd}\}$ (think carefully about transitivity of this relation).