MAU22C00 - TUTORIAL 2

1) Prove $A \setminus (A \setminus B) \subseteq B$.

2) In the country of Tannu Tuva, a valid license plate consists of any digit except 0, followed by any two letters of the English alphabet, followed by any two digits.

(a) Let D be the set of all digits and L the set of all letters. With this notation, write the set of all possible license plates as a Cartesian product.

(b) How many possible license plates are there?

3) (From the 2016-2017 Annual Exam) Let Q denote the relation on the set $\mathbb{Z}$ of integers, where integers x and y satisfy xQy if and only if

$$x - y = (x - y)(x + 2y).$$

Determine the following:

(i) Whether or not the relation Q is *reflexive*;

(ii) Whether or not the relation Q is *symmetric*;

(iii) Whether or not the relation Q is *transitive*;

(iv) Whether or not the relation Q is an *equivalence relation*;

Justify your answers.