M405 - HOMEWORK SET #2- DUE 02/15/19

- **Textbook exercises: pg. 37: 2, 4, 6, 7, 8**
- Define the set $\mathbb{Q}$ of rational numbers by

$$\mathbb{Q} = \{(a, b) \in \mathbb{Z} \times \mathbb{Z} \mid b \neq 0\}/\sim$$

where the equivalence relation $\sim$ is given by

$$(a, b) \sim (a', b') \text{ if } ab' = a'b.$$

Denote the equivalence class of (a, b) by $\frac{a}{b}$.

Prove that if $(a, b) \sim (a', b')$ and $(c, d) \sim (c', d')$, then

$$(ad + bc, bd) \sim (a'd' + b'c', b'd').$$

Conclude that the addition operation

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$$

is well defined on $\mathbb{Q}$.