1. Let \( \sim \) be the equivalence relation on \( X = \mathbb{N} \times \mathbb{N} \) given by \((a, b) \sim (c, d)\) means \(a + d = b + c\).

Define \( + \) on the set of equivalence classes \( X/\sim \) by \([a, b][c, d] = [(ac + bd, bd)\].

Show this is well defined, commutative and associative.

2. Use Schr"{o}dinger-Bernstein to prove \( (0,1) + \prod_{i=1}^{n} 0_{i,1} \leq C = 2^n \).

Hint: use the decimal expansion for each element in \((0,1)\).

3. Prove that \( X \sim Y \Rightarrow P(X) \sim P(Y) \).