MATH 4341 – Combinatorial Design Theory Assignment #1
Winter 2013

Instructions

- Answer each question completely; justify your answers.
- This assignment is due at

1. Suppose that we wish to find a linked design on a set S such that each block has size k, each element of S is found in exactly k blocks and each pair of blocks intersect in precisely one element. Determine (with proof) what $|S|$ must be in terms of k.

2. Find a Latin square of side 6.

3. Find a 1-factorisation on the set $S = \{1, 2, 3, 4, 5, 6\}$.

4. Find a 1-factorisation on the set $S = \{1, 2, 3, 4, 5, 6, 7, 8\}$.

5. Prove that there is a $(7, 7, 4, 4, 2)$-design and that it is unique up to isomorphism.

6. Prove that every $(6, 10, 5, 3, 2)$-design is simple.

7. Prove that no BIBD with $v = 8$, $k = 3$ and $\lambda = 1$ can exist.