MAT8010 Homework #4

Due Date: April 17, 2018

1. (2 points) Problem 15C, page 154 (Van Lint/Wilson).

2. (2 points) Find a bijection proof of the fact that $u(n) = o(n)$, where $u(n)$ is the number of partitions of n with unequal parts, and $o(n)$ is the number of partitions of n with odd parts.

3. (2 points) Problem 1F, page 9 (Van Lint/Wilson).

4. (2 points) Problem 1H, page 9. (Supplement to Problem 1H: Assume that G is a simple graph on the vertex set $\{1, 2, \ldots, n\}$. Let A be an adjacency matrix of G as defined in Problem 1H. Show that trace(A^2) equals twice the number of edges of G, and trace(A^3) is six times the number of triangles in G.)

5. (2 points) Let $A_1, A_2, \ldots, A_{1066}$ be subsets of a finite set $X \neq \emptyset$ such that $|A_i| > |X|/2$ for all i, $1 \leq i \leq 1066$. Prove that there exist ten elements $x_1, x_2, \ldots, x_{10}$ (not necessarily distinct) of X such that every A_i contains at least one of $x_1, x_2, \ldots, x_{10}$.

6. (2 points) Problem 3C, page 29, (Van Lint/Wilson).