NATIONAL UNIVERSITY OF SINGAPORE
Department of Mathematics

Module: MA3233 Algorithmic Graph Theory
Year/Semester: 2010-2011 (Semester 1)
Tutorial: 3

1. Draw all non isomorphic trees of order 7. How many of your trees T satisfy $\Delta(T) \geq 4$?

2. Let G be a graph of order $n \geq 2$ and $\boldsymbol{A}$ its adjacency matrix. Suppose $\boldsymbol{B} = (b_{ij})$ is the matrix
$$\boldsymbol{B} = \boldsymbol{A} + \boldsymbol{A}^2 + ... + \boldsymbol{A}^{n-1}.$$
Show that G is connected if and only if $b_{ij} \neq 0$ for all $i, j \in \{1, 2, ..., n\}$, $i \neq j$.

3. Prove that if $n \equiv 0$ or $1 \bmod 4$, then there exists a self-complementary graph of order n.

4. Find all self-complementary trees of order at least 2.

5. *(2001-02 Semester 1 Question 10)* Let G be a connected graph of order 10 and size 26. Prove that G contains a C_3.

6. If G is a connected graph of order 10 and size 25, must G contain a C_3?