This assignment is worth 15% of the final mark of the Formal Languages and Automata course. The documentation explaining your results are to be handed to the departmental secretary by Monday 15th December 2008. Assignments handed in late will be marked down by 3 marks (out of 15) per day. No assignments will be accepted after Friday 19th December 2008.

The Department of Computer Science takes a very serious view on plagiarism. Refer to the departmental website on plagiarism for more details:

http://www.cs.um.edu.mt/resources/plagiarism/

You are to solve all of the following problems.

Question 1 carries 9 marks. Question 2 carries 6 marks.

1. (a) Give a DFSA accepting $L_1 = \{ab^n \mid n \geq 0\}$.
   (b) Give a DFSA accepting $L_2 = \{b^n a \mid n \geq 0\}$.
   (c) Use the DFSAs for $L_1$ and $L_2$ and the constructions given in your notes to methodically construct a DFSA that recognises the language $L_3 = L_1 \cap L_2$.

2. (a) Prove the following laws about regular grammars:
   i. $e0 = 0$
   ii. $e1 = e$
   iii. $e_1(e_2 + e_3) = e_1e_2 + e_1e_3$
   iv. $1 + e^+ = e^*$
   (b) Use the constructions and proofs given in your notes to methodically construct a regular grammar recognising the same language as the one denoted by the regular expression $a^* + bb$. 