1. (100 points, 10+10 points each)

For each of the following languages:

(i) Construct a regular expression that describes the language, and

(ii) Build a DFA that accepts the described language. Explain how the machine works. 

No points will be given to machines without accompanying “comments”.

(a) The empty set (over \{a, b\}).

(b) The empty string (over \{a, b\}).

(c) \{w \mid w \in \{a, b\}^* \text{ and the length of } w \text{ is at least } 5 \}

(d) \{w \mid w \in \{a, b\}^*, w \text{ starts and ends with the same symbol, and } w \neq \lambda \}

(e) The set of strings over \{a, b\} that end with ’b’ and do not contain the substring ‘aa’.