Problem sheet -3 for Tutorial class on 16/2/2021

I. Each of the following languages is the intersection of two simpler languages. In each part, construct DFAs for the simpler languages, and then combine them appropriately to give the state diagram of a DFA for the language given

   a. $\{w|\ w$ has at least three a's and at least two b's$\}$
   b. $\{w|\ w$ has exactly two a's and at least two b's$\}$
   c. $\{w|\ w$ has an even number of a's and one or two b's$\}$
   d. $\{w|\ w$ has an even number of a's and each a is followed by at least one b$\}$
   e. $\{w|\ w$ starts with an a and has at most one b$\}$
   f. $\{w|\ w$ has an odd number of a's and ends with a b$\}$
   g. $\{w|\ w$ has even length and an odd number of a's$\}$

II. Each of the following languages is the complement of a simpler language. In each part, construct DFA for the simpler language, and then use it to give the state diagram of a DFA for the language given

   a. $\{w|\ w$ does not contain the substring ab$\}$
   b. $\{w|\ w$ does not contain the substring baba$\}$
   c. $\{w|\ w$ contains neither the substrings ab nor ba$\}$
   d. $\{w|\ w$ is any string not in $a^*b^*\}$
   e. $\{w|\ w$ is any string not in $(ab^+)^*\}$
   f. $\{w|\ w$ is any string not in $a^* \cup b^*\}$
   g. $\{w|\ w$ is any string that doesn't contain exactly two a's$\}$
   h. $\{w|\ w$ is any string except a and b$\}$

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