1. For the language represented by the regular expression \((a^*b)^*\) answer the following questions: [12 Points]
(a) What is the shortest string belonging to the language?
\(\lambda\)
(b) What is the second shortest string belonging to the language?
\(\emptyset\)
(c) What is the shortest string NOT belonging to the language?
\(a\)
(d) What is the second shortest string NOT belonging to the language?
\(aa, ba\)

2. Simplify the following regular expressions: [16 Points]
(a) \(a(a + b)^* + b(a + b)^*\)
\((a + b)^+\)
(b) \((a^*b)^* + (b^*a)^*\)
\((a + b)^*\)

3. Find a regular expression for the language accepted by the following NFA: [15 Points]
The labels on the arcs below are a's and b's.

\[(a + a^*b)^* (a + a^*b + aa)\]