CSCI 450 Fall 2024
Homework 3

Problem 1: (1.5 pts) For each regular expression below, state which of the following strings is in the language of the regular expression: λ, abba, bababb, and baaaa.

1. $(a + b)^*ab(a + b)^*$

2. $b^*ab^*ab^*$

3. $a + (a^*b)^*$

Problem 2: (1.5 pts) For each regular expression, give two strings that are in the corresponding language and two strings that are not.

1. $a(a + b)^*b$

2. $a^*a + λ + b^*$

3. $(ab + ba)^*$

Problem 3: (3 pts) Find regular expressions for:
1. All binary strings with <u>exactly two 1's</u> (e.g. 00010010, etc.)
2. The set $\{a^n b^m: n \geq 3, m \text{ is even}\}$
3. All binary strings with a double symbol (contain 00 or 11) somewhere

Problem 4: (2 pts) An NFA accepts the language generated by the grammar, draw the NFA.
S → abA,
A → baB,
B → aA | bb.

Problem 5: (2 pts) An NFA accepts the language generated by the grammar
S → abA,
A → baB,
B → aA | bb.
What is an equivalent regular expression?