1. Programming

Part a. Please change the following while-loop to a for-loop.

```java
int i = 1;
int n = 1;
while( i > 22 ){
    n = n + i*i;
    i++;
}
```

Part b. Given the following code:

```java
int i = 10;
int j = 20;
double x = 30.0;
```

Provide the values for the following:

- \( j/i \)
- \( j/i \times x \)
- \( x \times j/i \)
- \( x/i \)

Decide which lines below need to be modified to compile. Then make the change(s) necessary. (Use the definitions of \( i, j \) and \( x \) given above.)

```java
int k = i;
int m = x;
x = j;
```
Finite Automata

Draw the FA that accepts exactly the sentences from this language:

\[(AB)^* (BA)^*\]

2. Turing Machines

Look at these rules \((\#=\text{blank})\).

\[
\begin{align*}
0 \times & \rightarrow 1 \\
0 \text{ y} & \rightarrow 0 \\
0 \# \# & \rightarrow 2 \\
1 \times \# & \rightarrow 1 \\
1 \text{ y} & \rightarrow 0 \\
1 \# \# & \rightarrow 2 \\
2 \# & \rightarrow 1 \text{ h}
\end{align*}
\]

Given that the machine starts in state 0 and the head is on the left most x on this tape

\[
\text{xxyyxx##} \\
\uparrow \\
0
\]

What does the tape look like when the machine halts?
3. **Binary numbers**

Given the value 11101010 in binary (base 2), show the equivalent in decimal (base 10)?

What is the value of 159 (decimal) in binary?

4. **Booleans**

Fill in the following truth table:

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>(NOT a) OR (NOT b)</th>
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