

PRACTICE MIDTERM

1. Programming

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

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

Part b. Given the following code:

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

provide the values for the following:

j/i _____

$j/i*x$ _____

$x*j/i$ _____

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.)

`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 (#=blank).

```
0 x $ r 1
0 y $ r 0
0 # # r 2
1 x # r 1
1 y $ r 0
1 # # r 2
2 # $ l h
```

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

```
xyyx##
^
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:

a	b	(NOT a) OR (NOT b)