Problem set 1, Theory

Problem 1

What version of gcc, flex and bison is installed on the server?

- GCC: **4.6.3**
- Bison: **2.5**
- Flex: **2.5.35**

Problem 2

What is the difference between an interpreter and a compiler?

Interpreter:

- No preprocessing
- Limited optimization
- Required to run the program
- Good fit for "live" environment, aka a REPL

Compiler:

- Lots of preprocessing (basically **only** preprocessing)
- Lots of optimization
- Not required to run the program

Problem 3

A) Construct a nondeterministic finite automaton for the language `10*10(0|1)*0`

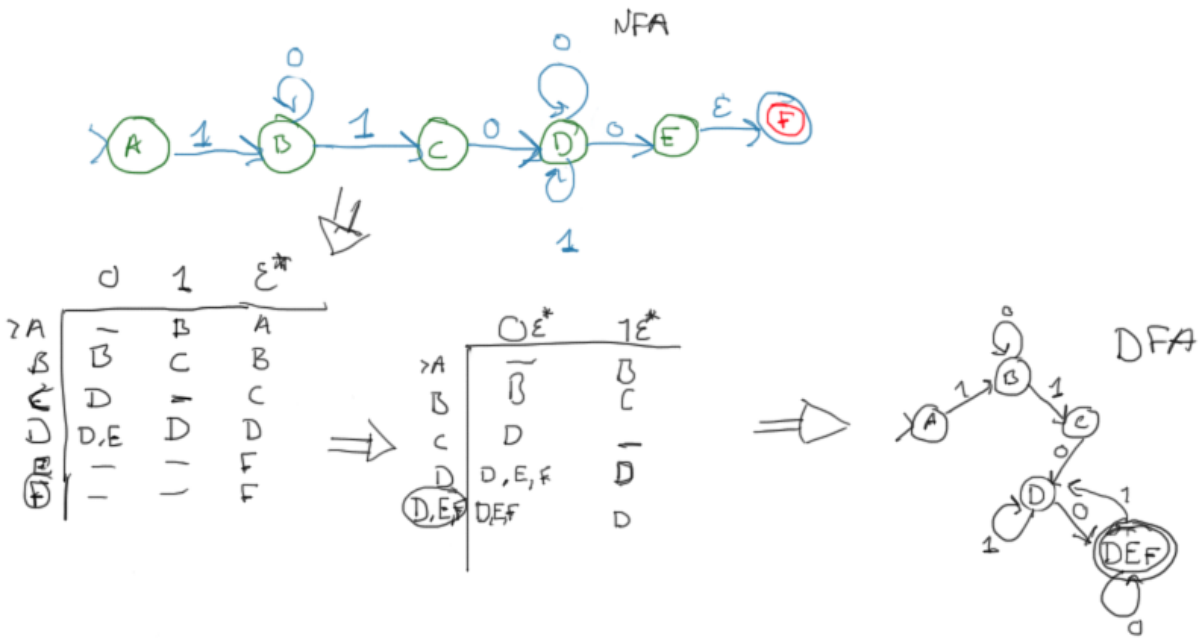

Figure 1: NFA accepting the language `10*10(0|1)*0`

B) Describe what kind of words the language includes

The NFA accepts binary strings that have the following properties: An even binary number starting with a 1, optionally followed by any number of zeroes, containing at least one `10`, optionally followed by any binary string, finally ending in an additional 0.

I'm don't really recognise this pattern, so I'm not sure how to explain the words accepted by this NFA other than "translating" the RegEx into english

```
* Example 1 - shortest word:  1100;
* Example 2 - longer word: 1000100
* Example 3 - even longer word: 1100101010
```

C) Create a transition table for the language, based on your automaton.

Node	0	1
A	-	B
B	B	C
C	D	-
D	{DEF}	D
{DEF}	{DEF}	D

Problem 4

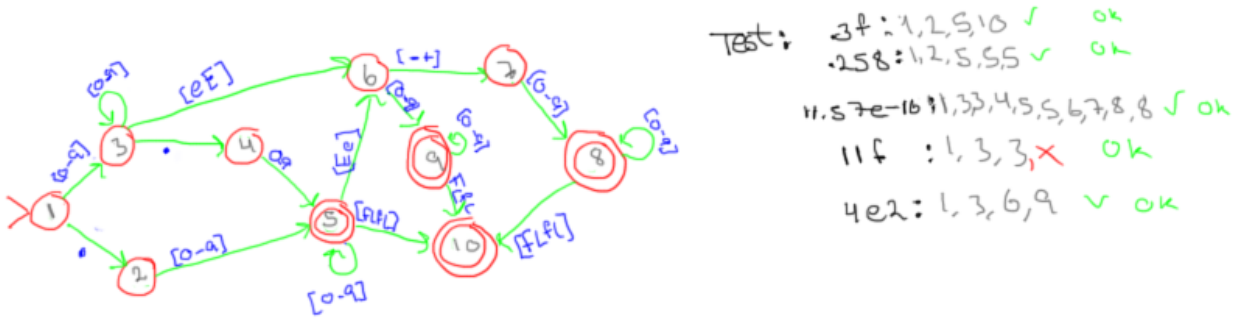

Figure 2: DFA accepting the floats as described in the text.

Note that the description does not allow for negative floats. Also, I have "cheated" by not having 9 edges between nodes where [0-9] is applicable.