Homework Week 2

(due September 11, 2020 via D2L)

You need to submit your work using type-setting (Word, Word-Perfect, Pages, Latex (preferred).

(1) The following code in C++ calculates the sum of an array of ints. Assume that there is no optimization. Calculate how many memory accesses there are and how many operations, including the calculation of the indices. Show your calculation.

```
int * array;  //assume that array has at least 100 ints
int suma = 0;
const int length{100}; //initializes length to 100

for(int i = 0; i < length; i++){
   suma += i*array[i]
}
```

(2) Determine with proof the asymptotic relationship using Landau notation of the following pairs of functions:

1. $\log_e(n)$ (the natural logarithm) and $\log_2(n)$
2. $\log_2(\log_2(n))n$ and $\log_2(n)^2 \cdot n$
3. $\sqrt{n}$ and $\log_2(n)$

(3) Give with explanation the equivalent DFA (transition table and naming of start state and final states suffices, no picture needed) of the following NFA