

Design and Analysis of Algorithms

Exercises 1/8

1. Give time complexity for the following algorithm and solve it.

```
INPUT n
A = 1
FOR i = 0 to n
  FOR j = 1 to A
    PRINT "x"
  END
  A = A*3
END
```

2. Compare the following time complexity functions: $T_1(n) = O(n)$, $T_2 = (n \log n)$, and $T_3(n) = n^2$. Can you say whether T_2 is closer to T_1 than it is to T_3 ? Why?
3. Moore's law is the observation that over the history of computing hardware, the number of transistors on integrated circuits doubles approximately every two years. It took 0.5 seconds in 2011 to run an algorithm by Intel Core i7 2600K, which can perform 128 300 Million instructions per second. Assuming that Moore's law will continue to hold in future, which year the same problem algorithm can be solved in one millisecond?
4. The goal of O-Mopsi game is to visit a set of (N) targets as fast as possible. Player can start anywhere, and clock starts ticking only when player press the start button. Define it as travelling salesman problem. What assumptions did you make? Show your solution for the example below.

