Tutorial 03: Jan 31

1. **Expected Runtime Again!**
   Give a tight bound on the expected number of iterations of the while loop in the following program.

   ```
   def silly(n):
       while n != 0:
           n = randint(0, n) # random int in {0, ..., n}
       print("done")
   ```

2. **Median Finding Lower Bound**
   Show that there is no comparison-based algorithm that can partition on the median of an array in time $O(n^c)$ for $c < 1$.

3. **Bounded Digit Sorting**
   Given an array A of n positive integers such that the total number of decimal digits in all integers combined is ℓ, design an algorithm to sort A in $O(\ell)$ time.