Tutorial Week 1

Definition 1. *For a **string** w, we say that w is **primitive** if there exists no other string u such that $w = u^k$, for some integer $k > 1$. Here u is called a **root** of w. Moreover, if $w = uvz$ for some strings u, v, z, then we call u a **prefix** of w, z a **suffix** of w, and each of u, v, z is called a **factor**.*

Exercise 1. *For the following list of strings, indicate their prefixes, suffixes, roots, and say if they are primitive or not.*

	prefixes	suffixes	roots	primitive
ababab				
aaaaaa				
abcacb				

Lemma 2. *If w is a primitive string, then w occurs as a factor of ww only as a prefix or a suffix.*

Proposition 3. *If for two strings u, v we have that $u^k = v^\ell$, for some integers $k, \ell > 0$, then u and v are powers of the same string.*

Proposition 4. *There exists one and only one primitive root for every string.*

Exercise 5. *Considering the brute-force algorithm presented in the course, how many comparisons does the algorithm do in order to find all occurrences of the pattern* `ana` *in the text* `bananas`*? Please recall that the algorithm will stop only when it reaches the end of the text. What about when we look in the text* `anaeatsabanana`*? What about in the text* `anabananananann`*?*