Exercise sheet 6

1. Prove that the intersection of two context free languages need not be context free. *(Hint: Try to realize* $\{a^n b^n c^n \mid a, b, c \in \{a, b, c\}\}$ *as the intersection of two context free languages).*
2. Prove that the complement of a context-free language need not be context free. *(Hint: use the previous exercise)*
3. Prove that the language $\{ww \mid w \in \Sigma\}$ is not context free.
4. Prove that the language over the alphabet $\{1\}$ consisting of strings with prime number of 1s is not context free.