1. Show that the function that decides if an integer is prime is primitive recursive. Things you might consider. You may use any of the primitive recursive operations discussed in homework or the class notes. Hint bounded search might be useful.

2. Sipser exercise 4.7. Let $B$ be the set of all infinite sequences over $\{0,1\}$. Show that $B$ is uncountable, by using a diagonalization argument. A set is uncountable if it can’t be put in 1-to-1 correspondance with the natural numbers.

3. Build a Gödel numbering for regular expressions over $\{0,1\}$ using techniques of handout 8. i.e. think of regular expressions as a tree like data structure with nodes for letters of the alphabet (0 or 1), concatenation, union, emptyset, emptystring, and kleene star. A good way to start is to write down the regular expressions as an inductive set with 6 ways to form, and write down your Gödel numbering as a function over that set with 6 cases.