1. For each of the folling integers n, find all the primitive roots mod n

   a) $n=11$

   b) $n=20$

   c) $n=8$.

2. Find the numbers of primitive roots of 47.

3. Show that 20 has no primitive roots

4. Prove Let r be a primitive root mod n, and let s be a positive integer

   Then r^s is a primitive root mod n iff $(s,\phi(n))=1$

5. Decide whether the following statement is true:

   If $d \mid \phi(n)$ then there exists a with order d mod n.

6. Prove that $\sigma_{F_n}(2) \leq 2^{n+1}$ where $F_n = 2^{2^n}+1$ is the nth Fermat number.

(7) Find the contintinued fraction expansion of $22/7$ and all the convergents. Plot the convergents in the real line

(8) Find the continued fraction expansion of f_{k+1}/f_k, where f_k is the k-th Fibonacci number.

(9) Show that if $a_0 > 0$ then

$$\frac{p_k}{p_{k-1}} = \langle a_k, a_{k-1}, a_{k-2} \dots a_1, a_0 \rangle$$

$$\frac{q_k}{q_{k-1}} = \langle a_k, a_{k-1}, \dots a_2, a_1 \rangle$$

Where $C_i = p_i/q_i$ $i \geq 1$ are the succesive convergents of $\langle a_0, a_1 \dots a_n \rangle$

(10) Show that $q_k \geq f_k$, for $k = 1, 2 \dots$ where $C_k = \frac{p_k}{q_k}$ is the k-th convergent of the continued fraction $\langle a_0, a_1 \dots a_n \rangle$ and f_k denotes the k-th Fibonacci number.