Quantum Computing - Exercises 9

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1. Find the regular continued fraction expansion of 37/17.

2. Show by induction that

$$p_{j-1}q_j - q_{j-1}p_j = (-1)^j$$

and deduce that $\gcd(p_j, q_j) = 1$.

3. Find $\gcd(231, 315)$.

4. Consider Shor's algorithm on page 123 of the lecture notes, for factoring $N = 15$ with the assumption that in step (i) we choose $x = 13$. Find the order of 13 modulo 15 for step (iii) and verify that step (v) leads to the factorization of 15. Repeat for factoring $N = 91$ with $x = 4$ and for $N = 18$ with $x = 5$.