MATH 113 HW 6: Orbits and cycles

Due in class on Thursday, October 12.

1. Prove that $(a_1, a_2, \ldots a_n) = (a_1, a_n)(a_1, a_{n-1}) \cdots (a_1, a_3)(a_1, a_2)$.
2. Section 8, exercise 40.
3. Section 8, exercise 53.
4. Section 9, exercise 2.
5. Section 9, exercise 10.
6. Section 9, exercise 27.
7. Prove that the order of an element in S_n is equal to the least common multiple of the lengths of the cycles in its cycle notation.
8. (a) Section 9, exercise 34.

   (b) Give an example of a cycle σ such that σ^2 is not a cycle.
9. The Fibbonacci numbers f_i are defined by:

   $f_1 = 1, f_2 = 1$, and $f_{n+2} = f_n + f_{n+1}$, for $n \in \mathbb{Z}^+$.

   Prove that by induction that $k|n$ implies $f_k|f_n$.
10. (from class) Prove that the least common multiple of two integers r and s is $\frac{rs}{gcd(r,s)}$.

Group Problem (Due in class on Thursday, October 10)

Prove that $\langle (1, 2), (1, 2, \ldots, n) \rangle$ is a generating set for S_n.