MathTLC Algebra
Homework # 2

1.
$$\pi = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ 2 & 4 & 5 & 1 & 6 & 7 & 3 & 8 & 10 & 9 \end{pmatrix}.$$

   (a) Draw the diagram of π.

   (b) Write π as a product of disjoint cycles.

   (c) Find the smallest positive integer n such that π^n is the identity.

   (d) Use c) to describe an efficient way of computing π^e for any positive integer e.

2. Let π be the permutation given by the following product of disjoint cycles $(137)(256)$. Write the permutation π in 2-line notation.

3. Simplify the following products of cycles:

   (a) $(135)(52)(34)(3456781)$

   (b) $(1567432)^{2033452}$

   (c) $(1346789)^{-1}$

   (d) $(15)(14)(13)(12)$

   (e) $(1345)(27431)(1345)^{-1}$

4. Let $\pi = (i_1, i_2, \ldots, i_k)$ be a cycle. Show that π is a product of $k-1$ cycles, each of length 2. (Hint: $(1,2,3) = (1,3)(1,2)$)