HW 4 Solutions.

(1) $\sigma^{-1} = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 1 & 3 & 5 & 4 & 6 \end{bmatrix}$

(6) $\tau\sigma = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 1 & 6 & 2 & 3 & 4 & 5 \end{bmatrix}$

$\sigma\tau = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 2 & 1 & 5 & 3 & 4 \end{bmatrix}$.

(no justification needed)

(2) (a) $(15)(234)$

(6) (b) $(124)(35)(6)$ (ok to omit (6)).

(6) (c) (1423)

(again no justification needed)

(3) (a) $|(14)| = 2$

(b) $|(14762)| = 5$

(8) (c) order 3

(d) order 6

(4) Check all cycle types — the largest lcm

(5) of the lengths of cycles in A_{10} is $7 \cdot 3 = 21$

(5) Use one of the Subgroup Tests (1-step,

(4) 2-step, or Finite).

(6) Two cycle types of order 4: 4,1,1, and

(4) 4,2. There are $\binom{6}{4} = 15$ sets of indices in the 4-cycle, and $3! = 6$ different 4-cycles

on the indices (1,2,3,4). So $15 \cdot 6 = 90$ 4-cycles. So in all there are 180 elements of order 4.

Cycle types of order 2:

	number
2,2,2	$\binom{6}{2}\binom{4}{2} = 90$
2,2	$\binom{6}{2}\binom{4}{2} = 90$
2	$\binom{6}{2} = 15$
	195

(this one is hard).

(4) (7) Use a Subgroup Test.

(37)