## Practice with Permutations! (Answer to Part (c)!)

(1) Draw pictures that represent the following permutations of the set $\{1, 2, 3, 4, 5, 6, 7, 8\}$:

(a) $\alpha = (1\ 2\ 3)(4\ 5\ 6)$
(b) $\beta = (1\ 4)(7\ 8)$
(c) $\gamma = (1\ 2)(7\ 8)$

(2) Compute the following products using the pictures from the previous problem.

(a) $\alpha\beta$
(b) $\beta\alpha$
(c) $\alpha\gamma$
(d) $\beta\gamma$

(3) Verify your previous answer by using the cycle decompositions of $\alpha$, $\beta$ and $\gamma$ rather than the pictures.

(a) $\alpha\beta = (1\ 2\ 3)(4\ 5\ 6)(1\ 4)(7\ 8)$

$$\alpha\beta = (1\ 5\ 6\ 4\ 2\ 3)(7\ 8).$$

(b) $\beta\alpha = (1\ 4)(7\ 8)(1\ 2\ 3)(4\ 5\ 6)$

$$\beta\alpha = (1\ 2\ 3\ 4\ 5\ 6)(7\ 8).$$

(c) $\alpha\gamma = (1\ 2\ 3)(4\ 5\ 6)(1\ 2)(7\ 8)$

$$\alpha\gamma = (1\ 3)(4\ 5\ 6)(7\ 8).$$

(d) $\beta\gamma = (1\ 4)(7\ 8)(1\ 2)(7\ 8)$

$$\beta\gamma = (1\ 2\ 4).$$