Reading Quiz §7 & 8

Key

1. Give an example of:

   (a) [1] a function that is onto, and

$f: \mathbb{R} \to \mathbb{R}$, $x \mapsto x$ $\quad$ $g: \mathbb{R} \to \mathbb{R}$, $x \mapsto x^3$ $\quad$ $h: \{1,2,3\} \to \{a,b\}$, $1 \mapsto a$, $2 \mapsto b$, $3 \mapsto a$

   (b) [2] a function with a well defined inverse.

f above has an inverse under composition (mainly itself)

g above has an inverse $g^{-1}: \mathbb{R} \to \mathbb{R}$, $x \mapsto \sqrt[3]{x}$

h does not have an inverse

2. [2] Let $X = \{1, 2, 3, 4\}$. Recall the symmetric group of degree 4 is a group whose elements are one-to-one onto maps $f : X \to X$, under composition. Find:

$$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 1 & 3 \end{pmatrix} \circ \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 2 & 4 & 1 \end{pmatrix}$$

   or equivalently, find: $(1, 2, 4, 3) \circ (1, 3, 4)$.

$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 3 & 2 \end{pmatrix}$ or $(1)(24)(3)$ or (24)