

§ 3.2 Homework Solutions

1) [BB]

3) f maps $f(-2)=4, f(-3)=9$ etc. $f^{-1}(x) = -\sqrt{x}$.

7) a) [BB] b) Suppose $f(x_1) = f(x_2) \Rightarrow 5 - \frac{1}{1+x_1} = 5 - \frac{1}{1+x_2} \Rightarrow -\frac{1}{1+x_1} = -\frac{1}{1+x_2}$
 $\Rightarrow \frac{1}{1+x_1} = \frac{1}{1+x_2} \Rightarrow 1+x_1 = 1+x_2$ (since $1+x_1$ and $1+x_2 \neq 0$)
 $\Rightarrow x_1 = x_2$. So f is One-to-One (injective).

9) a) [BB] b) Paternal grandmother c) maternal grandfather d) mother-in-law

12) [BB]

19) a) [BB] b) h is not a bijection (not injective since $h(1) = h(2) = 2$ and no element maps into 5).

$$\begin{aligned} f^{-1} &= \{(2,1), (1,2), (4,3), (5,4), (3,5)\} \\ g^{-1} &= \{(3,1), (5,2), (1,3), (2,4), (4,5)\} \end{aligned} \quad \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} \text{Simply reverse order of} \\ \text{each pair.} \end{array}$$

22) a) [BB]

b) Let b be any element of B

g is a function from B to $C \Rightarrow g(b)$ exists

$g \circ f$ is onto $\Rightarrow \exists a \in A$ such that $(g \circ f)(a) = g(b)$

g one-to-one $\Rightarrow f(a) = b$. Therefore f is onto (since b was any element of B)