1. Find the inverse function of $f(x)=e^{x+1}-2$. Determine the domain and range of the inverse function.

2. Given $f(x)=\sqrt{x}$, $g(x)=x-1$ and $h(x)=e^{x}$. Find $f\circ g\circ h$ and determine its domain.

3. Given $f(x)=\dfrac{3x}{x-2}$, $x\neq 2$.
   a) Find $f\circ f$. State the values of x for which $f\circ f$ is undefined.
   b) Find f^{-1} and state its domain
   c) If $(f\circ g)(x)=2x+1$, find the function $g(x)$

4. Given that functions g and h are defined as

   $g(x)=3|x|$

   $h(x)=x-2$

   a) State the domain and range of function g and h
   b) Find $g\circ h$ and sketch its graph
   c) Is $g\circ h$ a one to one functions? Why?
   d) What is the possible domain of $g\circ h$ if its inverse exist?

5. Given $f(x)=x+5$ and $h(x)=3-x^{2}$.

a) Find $(f\circ h)(x)$

b) Find $(h\circ f)(x)$

c) Find the value of x such that $(f\circ h)(x)=(h\circ f)(x)$

ANSWER :

1. $f^{-1}(x) = -1 + \ln(x+2)$; $D_{f^{-1}} = (-2, \infty)$; $R_{f^{-1}} = (-\infty, \infty)$
2. $(f \circ g \circ h)(x) = \sqrt{e^x - 1}$; $D_{f \circ g \circ h} = [0, \infty)$
3. a) $(f \circ f)(x) = \dfrac{9x}{x+4}$; -4 , 2 b) $f^{-1}(x) = \dfrac{2x}{x-3}$; $D_{f^{-1}} = (-\infty, 3) \cup (3, \infty)$

   c) $g(x) = \dfrac{2x+1}{x-1}$

4.

a) $D_{g(x)} = \Re$, $D_{h(x)} = \Re$

$R_{g(x)} = [0, \infty]$, $R_{h(x)} = \Re$

b) $g \circ h = 3|x-2|$

c) not one to one

d) $D_{g \circ h(x)} = (-\infty, 2]$ *or* $[2, \infty)$

5.

(a) $8 - x^2$

(b) $-x^2 - 10x - 22$

(c) -3