IB MATH HL
11th **By Rakesh Jha**

Functions - Basics

Part I - **No calculator – Qs 1-3** **[worked solutions on next page]**

1. State the domain and range for each function.

(a) $f(x)=\sqrt{9-x^2}$

(b) $g(x)=2^x$

(c) $h(x)=\dfrac{1}{2x^2-1}$

2. Let $f(x)=\dfrac{2}{x-4},\ x\neq 4$ and $g(x)=\dfrac{x}{2}-1,\ x\neq 4$

If $h=g\circ f$, find:

(a) $h(x)$

(b) $h^{-1}(x)$, where h^{-1} is the inverse of h.

3. Consider the quadratic function $g(x)=2x^2-16x+29$.

(a) Express $g(x)$ in the form $a(x-h)^2+k$.

(b) The graph of the function is a parabola. State the coordinates of the vertex and the equation for the axis of symmetry.

(c) Is the function f a one-to-one function? Explain.

Part II - **calculator allowed – Qs 4-7**

4. State the domain and range for each function.

(a) $f(x)=\dfrac{1}{x^2+3x-10}$

(b) $g(x)=\sqrt{\dfrac{8x-4}{x-3}}$

5. Given that $h(x)=(x-3)^2,\ x\geq 3$, find the inverse of $h^{-1}(x)$, and state its domain & range.

6. Given that $f(x)=2x-1,\ g(x)=x^2-3$ and $h(x)=\dfrac{1}{x+3}$, find the following:

[leave no brackets in answers]

(a) $h(g(x))$

(b) $f(h(x))$

(c) $g(h^{-1}(x))$

(d) Show that $f^{-1}(f(x))=x$

7. Consider the function $h(x)=\dfrac{3}{x^2-1}$

(a) Sketch a complete and accurate graph of h. Clearly label any x- or y-intercepts, and any asymptotes in your sketch.

(b) State the range of h.