IB Math 1   2B Function Notation

<u>Relation</u>: Any relationship between two variables.

<u>Function</u>: A relation in which each input has **only one** output.

<u>Function Notation</u> $f(x)$ $f : x \rightarrow$

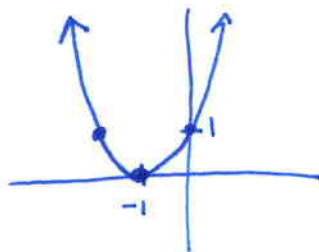$f : x \rightarrow x^2 + 2x + 1$

1. Sketch a graph.

y-int $(0,1)$ vertex $(-1,0)$

x-int $(-1,0)$

$f : x \rightarrow x^2 + 2x + 1$

$\rightarrow (x+1)^2$

Domain: $(-\infty, \infty)$

all real numbers

$\mathbb{R}$

Range: $[0, \infty)$

$y \geq 0$

$[0, \infty[$

2. Find x when $f(x) = 4$

$f(x) = x^2 + 2x + 1$

$4 = x^2 + 2x + 1$

$0 = x^2 + 2x - 3$

$0 = (x+3)(x-1)$

$4 = (x+1)^2$

$\pm 2 = x + 1$

$x + 1 = 2$ $x + 1 = -2$

$x = 1$, $x = -3$

$x = -3, 1$

3. Evaluate and simplify

a. $f(3a)$

$f(x) = x^2 + 2x + 1$

$f(3a) = (3a)^2 + 2(3a) + 1$

$= 9a^2 + 6a + 1$

b. $f(a+3)$

$f(x) = x^2 + 2x + 1$

$f(a+3) = (a+3)^2 + 2(a+3) + 1$
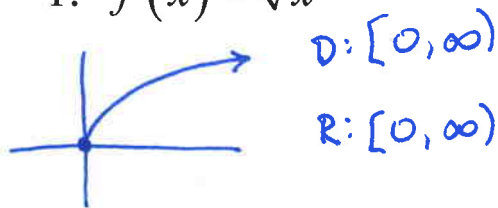
$= a^2 + 6a + 9 + 2a + 6 + 1$

$= a^2 + 8a + 16$

2C Domain and Range
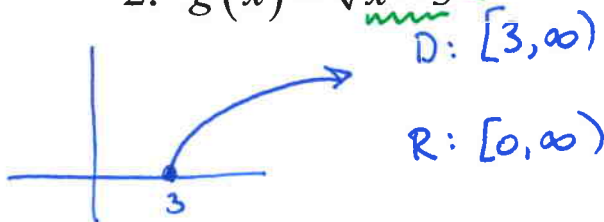
Find the Domain and Range of each function.

1. $f(x) = \sqrt{x}$

   D: $[0, \infty)$

   R: $[0, \infty)$

2. $g(x) = \sqrt{x-3}$ ← must be 0 or greater

   D: $[3, \infty)$

   R: $[0, \infty)$

   $x - 3 \geq 0$

   $x \geq 3$

3. $h(x) = 2 + \sqrt{5 - 3x}$

   0 or more

   $5 - 3x \geq 0$

   $-3x \geq -5$

   $x \leq \frac{5}{3}$
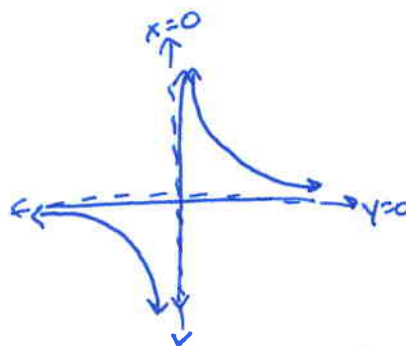
   D: $(-\infty, \frac{5}{3}]$

   R: $[2, \infty)$

4. $j(x) = \dfrac{1}{x+4}$

   D: $(-\infty, -4) \cup (-4, \infty)$ R, $x \neq -4$

   R: $(-\infty, 0) \cup (0, \infty)$ R, $y \neq 0$

   $y = \frac{1}{x}$

   $x = 0$

   $y = 0$

   D: $(-\infty, 0) \cup (0, \infty)$

   R, $x \neq 0$

   $\{x \in \mathbb{R} \mid x \neq 0\}$ super formal

   is in

   R: $(-\infty, 0) \cup (0, \infty)$

5. $k(x) = -4 + \dfrac{5}{x^2 - 36}$ ← cannot equal 0

   $x^2 - 36 = 0$

   $x = 6, -6$

   D: $(-\infty, -6) \cup (-6, 6) \cup (6, \infty)$

   R, $x \neq -6, 6$

   R: $(-\infty, -4) \cup (-4, \infty)$

   HW
   2B (3-5 odd letters, 6-12)
   2C (1-3, 4cefikl, 5abc)