2020 SAJC JC1 H2 Mathematics **Assignment 5: Functions**

Name: _____ Marks: /15

Class: 20_____ Time: 30 min

1. [NYJC/2017/Prelim/P1/Q7] The functions f and g are defined by

f : $x \mapsto e^{-x^2}$, $x \in \mathbb{R}$, $x < 0$, g : $x \mapsto \frac{1}{x+3}$, $x \in \mathbb{R}$, $x \neq -3$. **(i)** Show that g^{-1} exists, and define g^{-1} in a similar form. [3] **(ii)** State the solution set for $gg^{-1}(x) = x$ [1] **(iii)** Explain why fg^{-1} does not exist. [1]

Let the function h be defined by

h: $x \mapsto g(x)$, $x \in \mathbb{R}$, $x < k$. Where k is a real constant.

(iv) Given that fh^{-1} exists, state the maximum value of k. [1]

(v) For the value of k found in **(iv),**

(a) find the exact range of fh^{-1}, [2]

(b) solve $h(x) = h^{-1}(x)$. [2]

2. [HCI/2017/Prelim/P1/Q1(modified)] The *floor function*, denoted by $x\lfloor \ \rfloor$, is the greatest integer less than or equal to x. For example, $\lfloor -2.1 \rfloor = -3$ and $\lfloor 3.5 \rfloor = 3$.

The function f is defined by

$$f(x) = \begin{cases} 0 & \text{for } x \in \mathbb{R}, -1 \le x < 2, \lfloor x \rfloor \\ x & \\ 2 \le x & \\ < 3. & \end{cases}$$

It is given that $f(x) = f(x+4)$. **(i)** Find the values of f(- 1.2) and f(3.6) [2] **(ii)** Sketch the graph of $y = f(x)$ for $-2 \le x \le 4$. [2] **(iii)** State the range of f. [1]