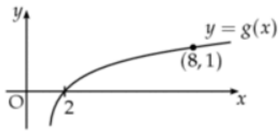
Higher Maths – Homework 4 Name ______________________________

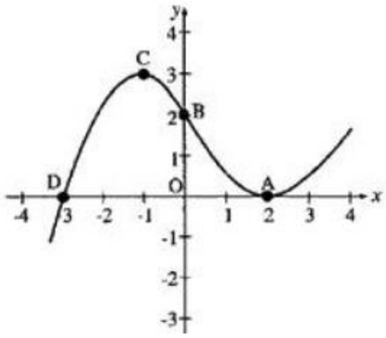
1. A function g is defined on a suitable domain by $g(x) = \log_a(x+b)$ where a and b are constants. The graph of $y = g(x)$ is shown below.



(a) State the values of a and b. **2**

(b) State the range of values of $x \in \mathbb{R}$ for which $g(x)$ is undefined. **1**

2. Part of the graph of $y = f(x)$ is shown in the diagram.



Make a sketch of the graph of $y = 2 - f(x)$ indicating the images of A, B, C and D. **3**

3. Functions f and g are defined on suitable domains by $f(x)=\dfrac{1}{\sqrt{x+3}}$ and $g(x)=x^2-2$.

(a) State a suitable domain for f. **1**

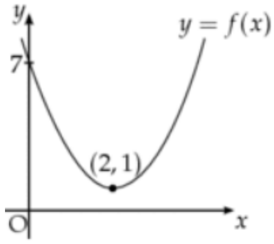
(b) Find an expression for $g\left(f(x)\right)$, giving your answer as a single fraction. **3**

4. (a) Express $7-2x-x^2$ in the form $a-(x+b)^2$ and write down the values of a and b. **2**

(b) State the minimum value of $\dfrac{40}{7-2x-x^2}$ and justify your answer. **2**

5. The diagram shows a parabola with equation $y = f(x)$.

The parabola has turning point $(2,1)$, and passes through the point $(0,7)$.



(a) Given that $f(x) = k(x-a)^2 + b$, write down the values of a and b and find the value of k. **3**

(b) Hence find the range of values of x for which $f(x) \leq 25$.

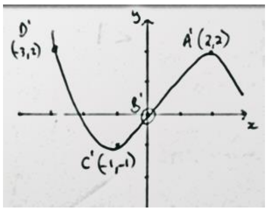
3

Answers to Higher Homework 4 – Functions

1(a) $a = 7,\ b = -1$

1(b) $g(x)$ undefined for $x < 1$

2.



3(a) $x > -3$

3(b) $g(f(x)) = \dfrac{-2x-5}{x+3}$

4(a) $8-(x+1)^2$ with $a = 8$ and $b = 1$

4(b) The minimum value of $\dfrac{40}{7-2x-x^2}$ occurs when $7-2x-x^2$ is at its maximum.

The maximum value of $7-2x-x^2$ is 8 - since max TP is at $(-1,8)$

Therefore, the minimum value of $\dfrac{40}{7-2x-x^2} = \dfrac{40}{8} = 5$

5(a) $a = 2,\ b = 1,\ k = \dfrac{3}{2}$

5(b) $-2 \le x \le 6$