Exam for candidates to HLAA

preDP2 January 2022

**P1 (90min)**

Name

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Question  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | sum |
| mark |  |  |  |  |  |  |  |  |  |
| max | 10 | 10 | 8 | 8 | 9 | 10 | 8 | 7 | 70 |

Q1 [10]

1. For what values of m the equation has at least one solution

$$\left(1-m\right)x^{2}-\left(4m-4\right)x-3m+5=0$$

1. For what values of m solutions have different signs.

Q2 [10]

Consider the function $f\left(x\right)=\frac{2x+3}{1-x}$

1. Describe the sequence of geometric transformations that transformed $g\left(x\right)=\frac{1}{x} $ into f(x)
2. Find equations of asymptotes and x and y intercepts of the graph of f(x)
3. Find the formula of $f^{-1}(x)$ and state the domain and range of $f^{-1}(x)$

Q3 [8]

Consider functions $f\left(x\right)=x^{2}-1 and g\left(x\right)=\sqrt{3-x}$

1. Find the formula $f°g$(x) and state its domain and range
2. For what values of x is the composition $g°f$(x) well defined?

 Find the formula of $g°f$(x) if it is defined and state its range.

Q4[8]

Let $f\left(x\right)=x^{2}-4x$ and $g\left(x\right)=f\left(2x-1\right)+3$

1. find the formula of $g\left(x\right)$ in the simpliest form

$ and describe the sequence of transformations that transformed f\left(x\right) into g(x)$

1. Let A and B are x intercepts of f(x). Find the coordinates of A and B and their images on g(x).

Q5 [9]

 At Grande Anse Beach the height of the water in metres is modelled by the function , where  is the number of hours after 21:00 hours on 10 December 2017. The following diagram shows the graph of  , for .



The point  represents the first low tide and  represents the next high tide.

How much time is there between the first low tide and the next high tide? *[1mark]*

 **b.** *[1 mark]* Find the difference in height between low tide and high tide.

 **c.** *[1 mark]* Find the value of ;

 **d.** *[2 marks]* Find the value of ;

 **e.** *[1 marks]* Find the value of .

**f.** *[3 marks]* There are two high tides on 12 December 2017. At what time does the second high tide occur?

Q6 [10]

Solve if $x\in [-π,2π]$

$$\left(4cos^{2}x-3\right)\left(tan^{2}x-3\right)=0$$

Q7 [8]

Consider function $f\left(x\right)=-2x^{2}+8x-3$

1. Express f(x) in the form $a\left(x-p\right)^{2}+q$
2. For $x\leq p$ sketch the graph of *f*(x)
3. For $x\leq p$ find $f^{-1}(x)$
4. Find $f^{-1}°f^{-1}(3)$

Q8 [7]

