**MATH 1073 Calculus I**

**Assignment 1**

(Due: , Sep, 2019)

1. (a) If and , is it true that *f* = *g*?  
   (b) If and , is it true that *f* = *g*?

**Solution：**

(a) The functions and give exactly the same output values for every input value, so *f* and *g* are equal.

(b) , so *f* and *g* [where ] are not equal because *f*(1) is undefined and .

1. (a) If *f* and *g* are both even functions, is *f+g* even? If *f* and *g* are both odd functions, is *f+g* odd? What if *f* is even and *g* is odd? Justify your answers.  
   (b) If *f* and *g* are both even functions, is the product *fg* even? If *f* and *g* are both odd functions, is *fg* odd? What if *f* is even and *g* is odd? Justify your answers.

**Solution：**



1. For each scatter plot, decide what type of function you might choose as a model for the data. Explain your choices.





(d)

(c)

**Solution：**

(a) The data appear to be periodic and a sine or cosine function would make the best model. A model of the form *f* (*x*) = *a* cos( *bx* ) + *c* seems appropriate.

(b) The data appear to be decreasing in a linear fashion. A model of the form *f(x)=mx+b* seems appropriate.

(c) The data appear to be increasing exponentially. A model of the form *f(x)=a∙bx* or  *f(x)=a∙bx* +*c* seems appropriate.

(d) The data appear to be decreasing similarly to the values of the reciprocal function. A model of the form *f(x)=a/x* seems appropriate.

1. Construct the composite functions *f(g(x))*, and specify the domain for each of the following:

(1) , ;

(2) , ；

(3) ,；

(4) ,

**Solution：**

（1），domain：;

（2），domain：;

（3），domain：;

（4），domain：;

1. (A) Let, find ；

(B) Let, find 

Solution:

* 1. Let , then , we can get



So, 

* 1. Let , then , we can get



So, 

1. Solve the Equation (Hint: It’s an unusual solution, in that it’s more than just a couple of numbers). Then, solve the equation . (Hint: if you make the correct substitution, you can use your solution to the previous equation).

Solution:

1. when , 2-x+3-x=1, we can get x=2, which contradicts with .
2. when , x-2+3-x=1, we can get 1=1. So the region satisfies the equation.
3. when , x-2+x-3=1, we get x=3. So only the value x=3 satisfies the equation.

So the solution of the equation is the interval [2,3].

(2)

Set  ,. By substituting it into the original function , gives



.

Which is actually the same function as (a).

Then by solving , we can get .

So the solution of the function is [5,10].

1. Find the range and domain of function.

Solution: Rewrite the function as . Since division by any number other than 0 is possible, the domain of  is the set of all number  except and. The range of is the set of all numbers  except y=0 and .

1. Find all intercepts of the given function.

Solution:

To find the y-intercept, set x=0 to obtain y=-1.

So the y- intercept is (0,-1).

To find the x- intercept, solve the equation f(x) =0. We can factor to get

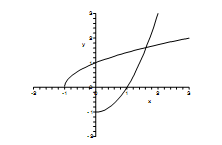
 , which implies .

So the x- intercept is (1, 0).

1. Show that and g are inverse functions. Graph both functions.

Proof:

Firstly, for all,  and is defined; Secondly, for all  andis defined. So f(x) and g(x) are inverse functions.



1. Use a triangle to simplify each expression. Where applicable, state the range of x’s for which the simplification holds.

(a) (b)

Solution:

(a)

Let , we have ,then . Since  and ,

we get , i.e. .

So, .

(b) Let , we have .

Since ,

we get ,

i.e. ( or ).