By the end of this course students should be able to

* + Know how to apply different techniques and various methods of differentiation.
  + Identify the problems and use methods in solving optimization problems.
  + Identify any geometric curve represented by an algebraic equation.
  + Solve the problems which includes physical quantities depending on two or more variables
* **Function**
  + Definition: A **function** *f* is a rule that assigns to each element in a set ***D*** exactly one element, called , in a set ***E****.*
  + Example: The area A of a circle depends on the radius r of the circle. The rule that connects r and A is given by the equation . We can say that A is a ***function*** of r.
* **Domain and Range**
  + The set ***D*** is called the domain and set ***E*** is called the range of the function.
  + Example: Sketch the graph and find the domain and range of each function
    - (i) (ii)

**Power Function**

A function of the form , where *a* is a constant, is called a **power function**.

***[ Note by -Jannatul Ferdous Umama(Bristy)]***

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**Exponential and Logarithmic function**

***[ Note by -Jannatul Ferdous Umama(Bristy)]***

* **Absolute value function**:

The turning point is (1, 2)

* **Heaviside function**

**Find the domain of the function**

**Example-1**

Solution The condition is

**Example-2**

Solution The condition is .

**Example-3**

Solution The condition for the denominator:

The condition for the numerator:

**Example-4**

Solution The condition is

***[ Note by -Jannatul Ferdous Umama(Bristy)]***

* **Limit**
  + Definition:
  + Suppose is defined when is near the number *a*.
  + Then we write and

say “the limit of , as approaches *a*, equals *L”.*

* + - **Limit Laws:**

If and exist, then

1. 2.

3. 4.

5.

* **Continuity**
  + Definition: A function *f* is continuous at a number *a* if

The definition implicitly requires three things if *f* is continuous at *a:*

* + - 1. is defined (that is, *a* is in the domain of )
      2. exists

Example: Test continuity of at ,

Solution:

* 1. is defined at and
  2. LHL: RHL:

is continuous at

***[ Note by -Jannatul Ferdous Umama(Bristy)]***

* **Two-sided Limit**

if and only if

Left-hand Limit

and

Right-hand Limit

Example

Heaviside function

does not exist (

***[ Note by -Jannatul Ferdous Umama(Bristy)]***