# **Task 1**

1. **f(x) = in interval [0, 10]**

f´(x) =

**Stationary point** : ***x = 0***

We can see the domain of f(x) is x>=0.

So, the function is discontinuous at x=0 i.e. f(x) is discontinuous. To be specific left side limit doesn’t exist.

Also, domain of f´(x) is also x>=0 and is always f´(x) >= 0. So, at x = 0 we have a ***minima***.

**Checking bounds** : f(0) = 0 which is in interval [0, 10].

1. **f(x) = in interval [-1, 1]**

f´(x) =

**Stationary Points :** ***x = 0***

f´´(x) = 6x

f´´(0) = 0 Oops.. x = 0 could be point of **inflexion or extremum**. So, we find more derivatives until we find non – zero at stationary point or not so sure stationary point x = 0.

f´´´(x) = 6 ahha!! Positive i.e. > 0. So we have a ***minima*** at x = 0.

**Checking Bounds :** f(0) = 0 which is within [-1, 1]

1. **f(x) = in the interval [10, 0]**

f´(x) =

=

=

**Stationary Points:**

***X = 0, ,***

f´´(x) =

f´´(0) = 0

f´´() = = f´´(-) and is >0

So, ***two minima*** at X = ,

We are not done yet coz we have f´´(0) = 0

So, which is less than 0, ***maxima*** found.

**Checking bounds:**

**and 0** are the points between interval [10, 0]

1. **f(x) = in the interval [0, ]**

f´(x) =

**Stationary point:**

x = e

f´´(x) =

f´´(e) = e > 0

So, at x = e we have a **minima.**

**Checking Bounds:**

f(e) = e which is within the interval.

1. **f (x) = sin(x) - x in R and in the interval [0;]**

f´(x) = cos(x) – 1

**Stationary point:**

**cos(x) = 1 where x = where n any integer. Infinite stationary points**

f´´(x) = -sin(x)

Now, -sin() = 0 ……oops!! It means that those points could be point of inflexion.

f´´´(x) = -cos(x) aha!! -cos() = -1 > 0

Now, that was 3rd derivative. So, n+1 = 3 i.e. n = 2

So, all points **x =**  where n is any integer is a point of inflexion.

**Checking Bounds:**

**x =**  where n ≥ 0

1. **f(x) = cos(2x) – x in interval [0, ]**

f´(x) = -2sin(2x) – 1

**Stationary point:**

sin(2x) =

General solution for the equation above is:

**x = ,**

f´´(x) = −4cos(2x)

-4cos() > 0 for any integer n, so these are **minimas.**

-4cos() < 0 for any integer n, so these are **maximas.**

**Checking Bounds:**

Points that lie within given interval are  **which is a minima.**