# Chapter 12 – 5 Absolute Extrema

Recall that local extrema are high and low points on a graph within a given locale or neighborhood. Absolute extrema are the highest point and the lowest point over the entire domain of the function. It is possible for a function to have local extrema but no absolute extrema.

**Example 1.** Find the local and absolute extrema of the function

Domain:

 implies is a critical value.

There are no local or absolute maxima and the local and absolute minimum is

**Example 2.** Find the local and absolute extrema of the function

Domain:

 has no real solutions.

There are no local or absolute extrema.

**Example 3.** Find the local and absolute extrema of the function

Domain:

 implies and are critical values.

 implies has no concavity at and is concave down at . There is an inflection point at and at

There are no local or absolute minima. The local and absolute maximum is .

**Example 4.** Find the local and absolute extrema of the function

Domain:

 implies is a critical value.

 implies has an inflection point at and is concave down at .

The local and absolute minimum is .

**Example 5.** Find the local and absolute extrema of the function

Domain:

 implies .

 implies has no inflection points, is concave down for and f(x) is concave up for .

There are no absolute extrema. There is a local maximum of at and a local minimum of at

**Example 6.** Find the local and absolute extrema of the function

Domain:

 implies and are critical values.

 implies has inflection points at and . The function is concave down for concave up on the interval , concave down on the interval , and concave up for .

The local and absolute maximum is .