

# Summary: Optimization: Max Min problems

## **The Extreme Value Theorem**

If  $f$  is continuous on a closed interval  $[a, b]$ , then there are points at which  $f$  attains its maximum and its minimum on  $[a, b]$ .

It is important to note that this is only guaranteed if the interval is finite and closed. We will talk about infinite intervals and open intervals a little later.

The proof of this theorem is beyond the scope of this course, so we will not present it here.

## **Candidates for Extrema**

We want to find the maximum or minimum value of a continuous function  $f$  on a closed interval  $[a, b]$ . The Extreme Value Theorem guarantees that they will be attained.

The maximum and minimum can only be attained at critical points or end-points, so we just need to run through all of those candidates to find the largest and smallest values of  $f$ .