

Section 4.1: Maximum and Minimum Values

(1) In this section, we talk about minimum and maximum values. First, let's make sure we know the definitions. What is an absolute minimum or maximum value? What is a local maximum or minimum value?

(2) What does the extreme value theorem say?

(3) In order for the extreme value theorem to apply you need to have a continuous function on a closed interval. Let's see what can go wrong if you don't.

(a) Give an example of a function (a sketch of its graph is sufficient) which is not continuous on $[a, b]$ and does not have an absolute maximum but does have an absolute minimum.

- (b) Give an example of a continuous function on $(a, b]$ (a sketch of its graph is sufficient) that does not have an absolute minimum but does have an absolute maximum.
- (4) What does Fermat's theorem say? How do we use it? What are critical numbers? How are they related to Fermat's theorem?
- (5) (Important) What do we need to do to determine the absolute minimum and maximum value of a function?