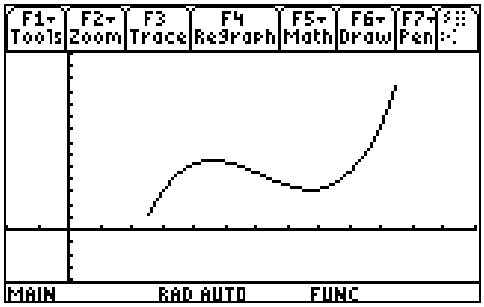
Problem 1 – The Intermediate Value Theorem

The *Intermediate Value Theorem* states the following:

> If *f* is continuous on a closed interval [*a*, *b*] and *k* is any number between *f*(*a*) and *f*(*b*), inclusive, then there is at least one number *c* in the interval [*a*, *b*] such that *f*(*c*) = *k*.

1. Why must the function be continuous on the interval [*a*, *b*]?



2. For what values of *k* are there more than one value for *c*? Does this contradict the Intermediate Value Theorem? Why or why not?

Problem 2 – The Extreme Value Theorem

The *Extreme Value Theorem* states the following:

> If a function *f*(*x*) is continuous on a finite closed interval [*a*, *b*], then *f*(*x*) has both an absolute maximum and an absolute minimum on [*a*, *b*].

3. Describe a function that fulfills the hypothesis of the Extreme Value Theorem.

4. Sketch two examples of function that do not fulfill the hypothesis of the Extreme Value Theorem. Explain what condition(s) of the Extreme Value Theorem is not satisfied.