

## Handout: The Closed Interval Method (Concepts from Section 4.1)

### Definition of Critical Number

**Words:** critical number of a function  $f$

**Meaning:** an  $x = c$  such that

- $f'(c) = 0$  or  $f'(c)$  DNE
- $f(c)$  exists (that is,  $x = c$  is in the domain of  $f$ )

Critical numbers are  $x$  values where a local max or min, or an absolute max or min might occur.

### The Closed Interval Method

For finding the abs max value and abs min value for a continuous function on a closed interval.

**Step 1:** Confirm that the interval is closed and that the function is continuous.

**Step 2:** Find the critical numbers of the function

**Step 3:** Make a 2-column table.

In the left column, put a list of important  $x$  values in increasing order:

- left endpoint
- critical numbers in the interval
- right endpoint.

In the right column, put the corresponding  $y$  values.

So the table will look like this:

<i>important x values</i>	<i>corresponding y values</i>
$x = a$ (endpoint)	$f(a)$
$x = c_1$ (critical)	$f(c_1)$
$\vdots$	$\vdots$
$x = c_k$ (critical)	$f(c_k)$
$x = b$ (endpoint)	$f(b)$

**Step 4:** Identify the greatest and least  $y$  values in the list. These are the absolute max value and the absolute min value. Write a clear conclusion.