

A car travels a distance of 100 miles in 2 hrs.

Find the average speed of the car during this trip.

Does the car have to travel at the average speed for the entire distance?

Is it possible that the car could travel the entire distance without ever going the average speed?

### The Mean Value Theorem

If  $f$  is continuous and differentiable on a given interval  $[a, b]$ , there is a point  $c$  somewhere on  $[a, b]$  where the derivative at  $c$  is the same as the slope from  $a$  to  $b$ .



With the Mean Value Theorem in mind...

If a function has a **positive derivative** at a certain point, the slope between the surrounding critical numbers must be

\_\_\_\_\_.

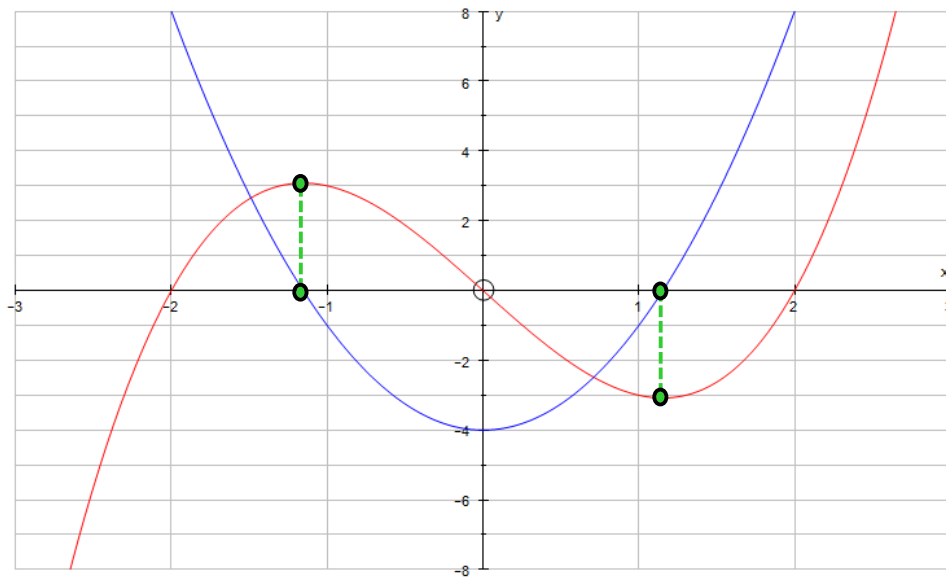
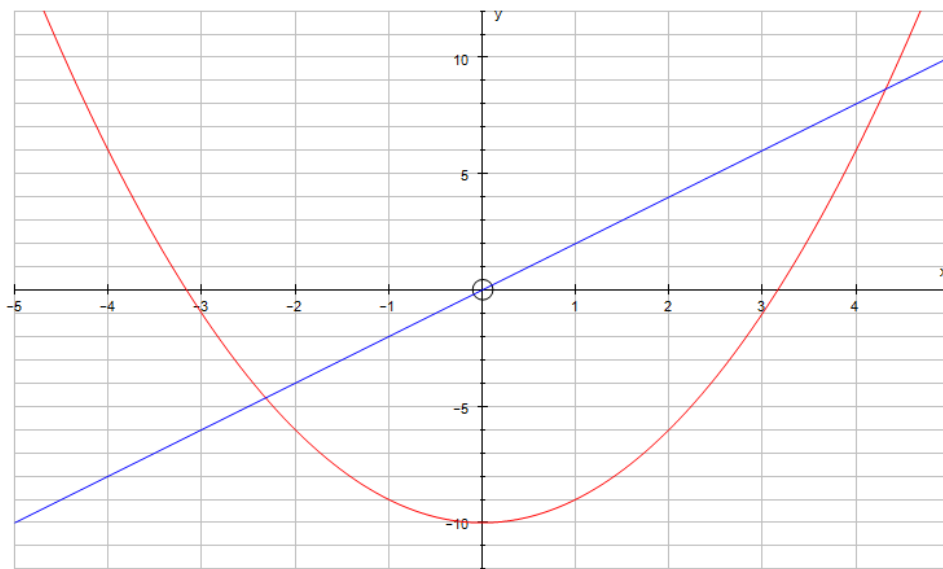
If a function has a **negative derivative** at a certain point, the slope between the surrounding critical numbers must be

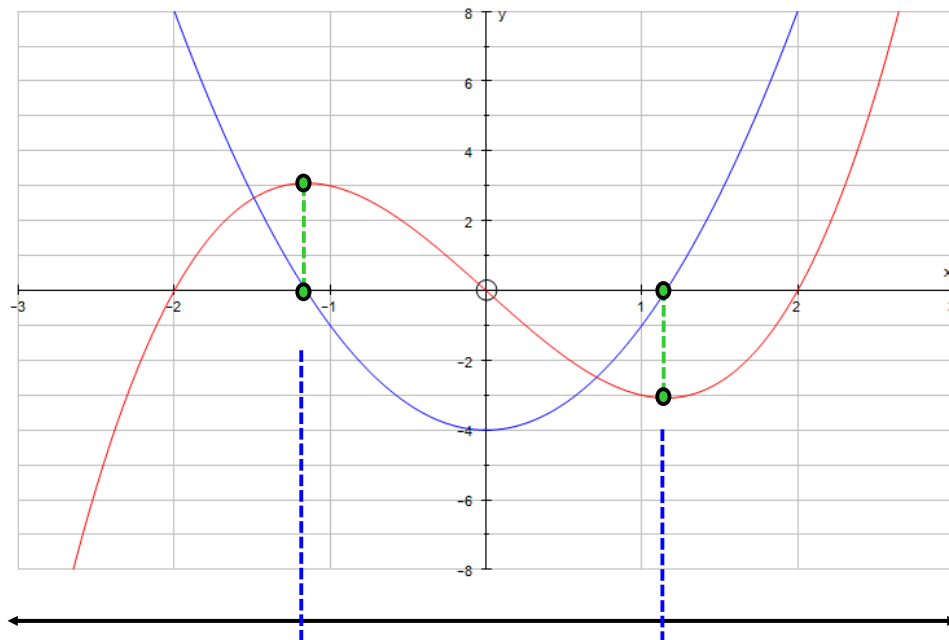
\_\_\_\_\_.

Let  $f$  be continuous on  $[a, b]$  and differentiable on  $(a, b)$ ...

1. If  $f' > 0$  at each point on  $(a, b)$ ,  
then  $f$  is \_\_\_\_\_ on  $[a, b]$
2. If  $f' < 0$  at each point on  $(a, b)$ ,  
then  $f$  is \_\_\_\_\_ on  $[a, b]$

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Homework:

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