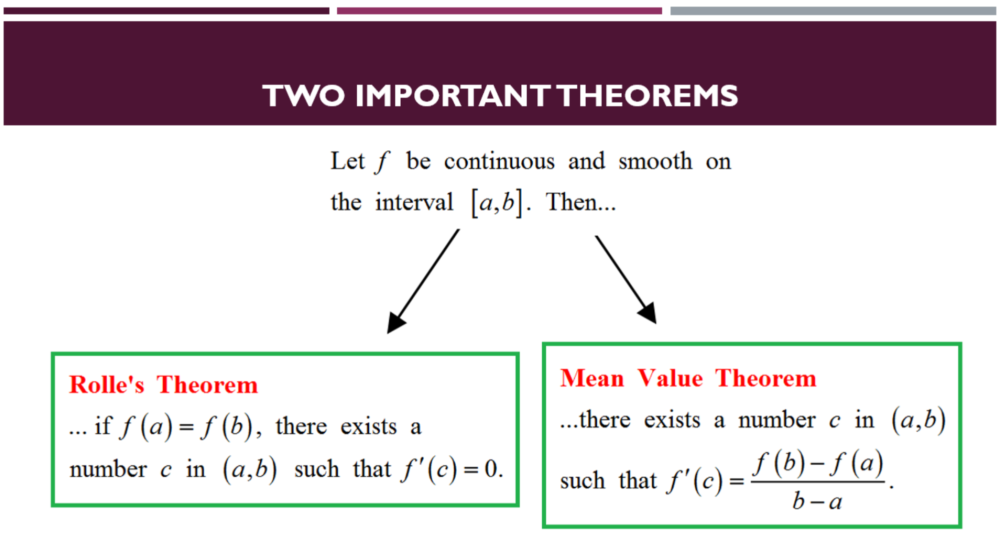
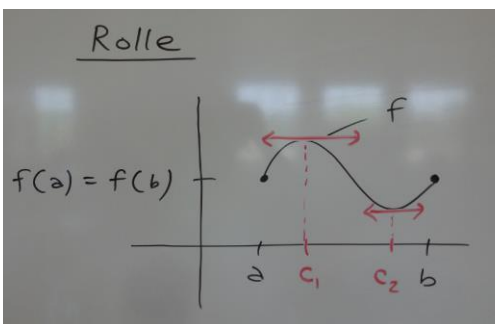
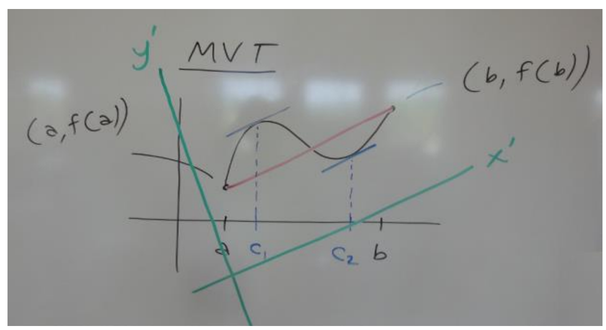
June 2, 2017

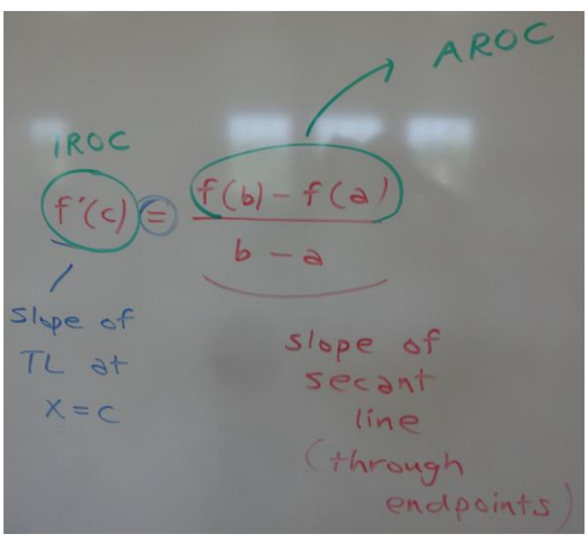
3.2: Mean Value Theorem



<u>Visual thinking for Rolle's Theorem & the Mean Value Theorem</u>. Notice that Rolle's Theorem is a special case of the more general MVT.



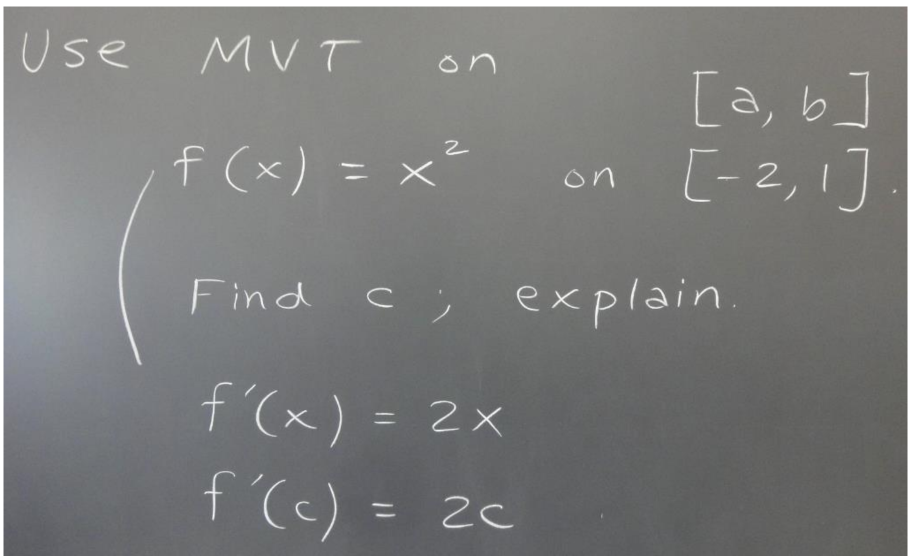


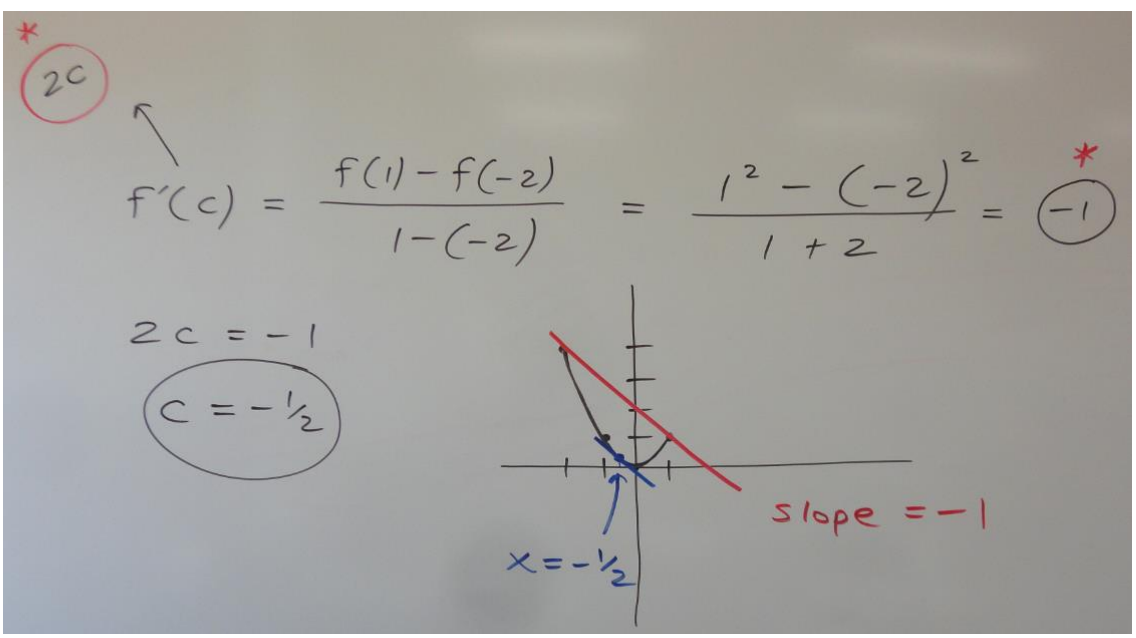


← MVT

WARM UP

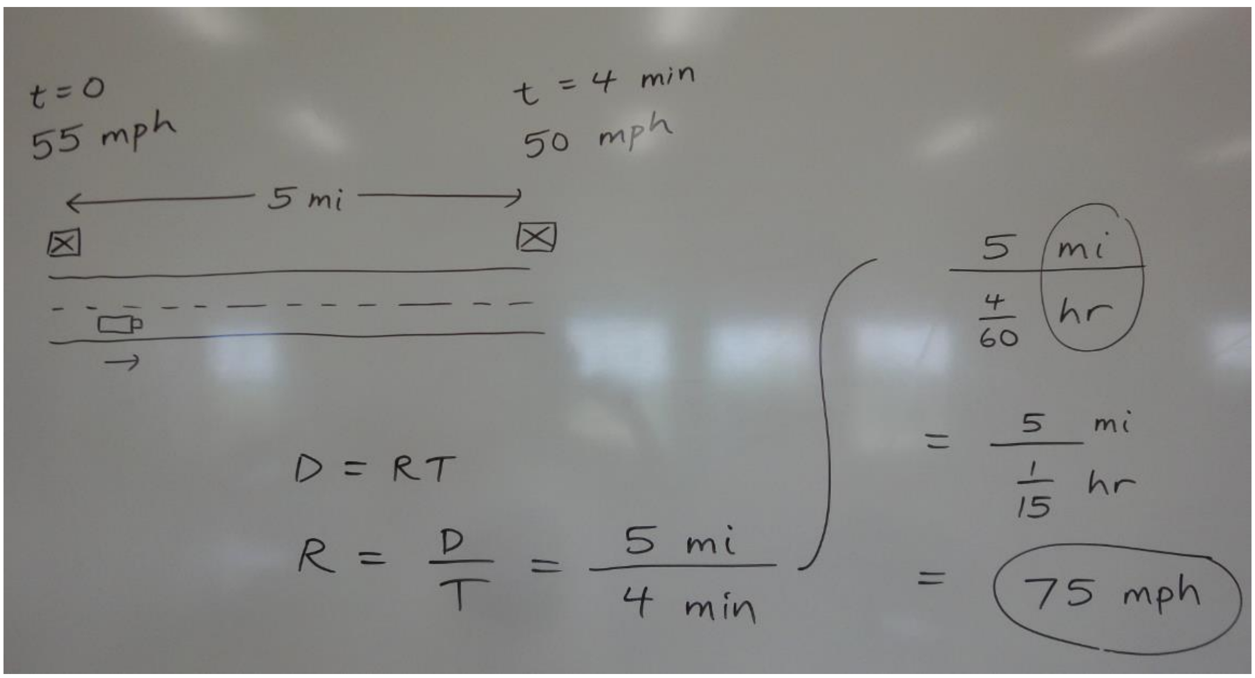
Apply the Mean Value Theorem to $f(x) = x^2$ on the interval $[-2,1]$. If possible, find the c value and explain what it means.





PROBLEM

Two stationary patrol cars are 5 miles apart on a highway. As a truck passes the first patrol car, its speed is clocked at 55 mph. Four minutes later, when the truck passes the second patrol car, its speed is clocked at 50 mph. Prove that the truck must have exceeded the speed limit (>55 mph) at some time during the trip.



The above work tells us that the truck driver’s *average velocity* between the officers was 75 mph. Using the MVT idea (the rate of change interpretation), **there must have been an instant somewhere between the officers where the driver was traveling *exactly* 75 mph** (instantaneous rate of change). We don’t know where this occurred but the MVT guarantees it occurred somewhere during the journey. There is clear evidence to support a speeding ticket.