Name: _____ Date: _____

Calculus AB Mean-Value Theorem Ms. Loughran

Check that the hypotheses of the Mean-Value Theorem are satisfied on the given interval. If so, find all the values of c in that interval that satisfy the conclusion of the theorem.

1. $f(x) = x^2 + x$; $[-4, 6]$

2. $f(x) = \sqrt{x+1}$; $[0, 3]$

3. $f(x) = \sqrt{25 - x^2}$; $[-5, 3]$

4. $f(x) = 2x^{\frac{1}{4}}$; $[-2, 1]$

5. If $f(x)=\begin{cases}2x+2, & \text{if } x\le -1\\ x^3-x, & \text{if } x>-1\end{cases}$, determine whether f satisfies the conditions of the mean value theorem on $[-3,2]$. If the function does satisfy the conditions of the mean value theorem, find the value of c.

6. Two stationary state trooper patrol cars equipped with radar are located 5 miles apart on a highway. As a truck passes the first patrol car, its speed is clocked at 55 miles per hour. Four minutes later, when the truck passes the second patrol car, its speed is clocked at 50 miles per hour. The speed limit on this road is 60 miles per hour. The state trooper in the second patrol car pulls the truck over and gives the driver a speeding ticket.

   The truck driver decided to fight this ticket in court. You are the lawyer for the state and need to defend the trooper who issued the ticket. Prove that the truck must have exceeded the speed limit at some time during the four minutes described above.