5.1 The Mean Value Theorem

Calculus

Name: ______________________________

CA #2

t seconds	0	4	10	20
$S(t)$ meters	0	20	32	-10

Skater Sully is riding a skateboard back and forth on a street that runs north/south. The twice-differentiable function S models Sully's position on the street, measured by how many meters north he is from his starting point, at time t, measured in seconds from the start of is ride.

1. For $4 \leq t \leq 10$, must there be a time t when Sully is 30 meters from his starting point? Justify your answer.

2. For $0 \leq t \leq 4$, must there be a time t when Sully's velocity is 2.7 meters per second? Justify your answer.

Using the Mean Value Theorem, find where the instantaneous rate of change is equivalent to the average rate of change.

3. $y = x^2 + 6x + 9$ on $[-4, -2]$	4. $y = -\sqrt{7x + 21}$ on $[-3, 1]$	5. $y = \frac{-x^2+1}{4}$ on $[1, 3]$

Answers to 5.1 CA #2

1. $S(4) = 20, S(10) = 32$ Yes, by the IVT there is a value c such that $S(c) = 30$ and $4 \leq c \leq 10$.	2. $\frac{S(4)-S(0)}{4-0} = \frac{10-0}{4} = 2.5$ No guarantee.	3. -3	4. -2	5. 2