5.1 The Mean Value Theorem

Calculus Name: _____ **CA #1**

t seconds	11	16	35	40
$s(t)$ cm	-8	2	-20	-10

A particle is moving along the y-axis. The twice-differentiable function s models the particles distance from the origin, measured in centimeters, at time t, measured in seconds.

1. For $35 \leq t \leq 40$, must there be a time t when the particle is 15 cm below the origin? Justify your answer.

2. For $11 \leq t \leq 16$, must there be a time t when the balloon's velocity is 3.5 cm 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. $y = x^2 - 8x + 14$ on $[1, 6]$

4. $y = -(x+1)^{\frac{2}{3}}$ on $[-1, 7]$

5. $y = \sqrt{3x}$ on $[0, 3]$

Answers to 5.1 CA #1

1. $h(35) = -20$, $h(40) = -10$ Yes, by the IVT there is a value c such that $h(c) = 30$ and $35 \leq c \leq 40$.	2. $\frac{h(16)-h(11)}{16-11} = \frac{2-(-8)}{5} = 2$ No guarantee.	3. $\frac{7}{2}$	4. $\frac{37}{27}$	5. $\frac{3}{4}$