Tabular data: IVT, MVT, and Rolle's

Let s(t) be a differentiable function on [0, 9] where t is in seconds and s(t) is measured in meters.

t	0	1	4	9
s(t)	3	-2	2	3

1. Estimate s'(1). Include units of measure.

2. Estimate s'(9). Include units of measure.

3. For **0 < t < 9**, how many time(s) must s(t) = 0? Justify your answer.

4. For **0 < t < 9**, must there be a time t when s'(t) = 0? Justify your answer.

5. For **0 < t < 9**, must there be a time t when s(t) = 4? Justify your answer.

6. For **0 < t < 4**, must there be a time t when s'(t) = - 1/4? Justify your answer.

7. For **0 < t < 1**, must there be a time t where s'(t) = 4? Justify your answer.

A car travels on a straight track. During the time interval [0, 60] seconds, the car's velocity v, measured in feet per second, is a differentiable function.

t	0	15	25	30	35	50	60
v(t)	1	5	2	1	2	4	2

8. Estimate v'(40). Include units of measure.

9. For **30 < t < 50**, must there be a time t where v(t) = 3? Justify your answer.

10. For **0 < t < 30**, how many time(s) must v(t) = 3? Justify your answer.

11. For **0 < t < 30**, how many time(s) must v'(t) = 0? Justify your answer.

12. For **50 < t < 60**, must there be a time t when v'(t) = - 1/5 ? Justify your answer.

13. For **0 < t < 25**, must there be a time t when v'(t) = 2? Justify your answer.

Answers (These are only the answers, not the full justifications)

1 -1/4 m/sec (Answers may vary)
2 1/5 m/sec (Answers may vary)
3 IVT; at least twice
4 Rolle's; at least once
5 No
6 MVT; at least once
7 No

8 2/15 ft/sec^2 (Answers may vary)
9 IVT; at least once
10 IVT; at least twice
11 Rolle's; at least 1 time
12 MVT; at least once
13 No