DATE: ____________

1. The data in the table below give selected values for the velocity, in meters/minute, of a particle moving along the x-axis. The velocity v is a differentiable function of time t.

Time t (min)	0	2	5	6	8	12
Velocity $v(t)$ (meters/min)	-3	2	3	5	7	5

a) Is there a time during the interval $0 \le t \le 12$ minutes when the particle is at rest? Explain your answer.

v is cont b/c v is diff'able on [0, 12]

By IVT, since $v(0) < 0$ and $v(2) > 0$,

there is a time during [0,12] when particle is at rest.
($v(t) = 0$)

b) Let $a(t)$ denote the acceleration of the particle at time t. Is there guaranteed to be a time $t = c$ in the interval $0 \le t \le 12$ such that $a(c) = 0$? Justify your answer.

v is cont b/c v diff'able
v is diff'able b/c given
} ∴, MVT applies

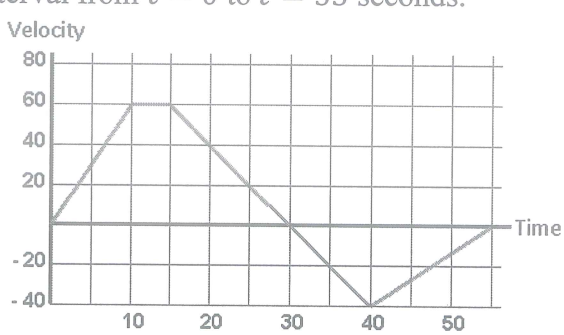
$a(t) \Rightarrow v'(t)$

$$a(c) = \frac{v(12) - v(6)}{12 - 6} = \frac{5-5}{6} = 0$$

∴, by MVT, there is guaranteed to be a time $t = c$ on [0,12] s.t. $a(c) = 0$.

---

2. The graph below represents the velocity v, in feet per second of a particle moving along the x-axis over the time interval from $t = 0$ to $t = 55$ seconds.



Is there guaranteed to be a time in the interval $30 \le t \le 55$ such that $v'(t) = 0$ ft/sec^2? Justify your answer.

$v(t)$ is not diff'able on [30,55] b/c $\lim_{t \to 40^-} v'(t) \neq \lim_{t \to 40^+} v'(t)$

∴, MVT does not apply and cannot guarantee a time on [30,55] s.t. $v'(t) = 0$.