Mathematics 122

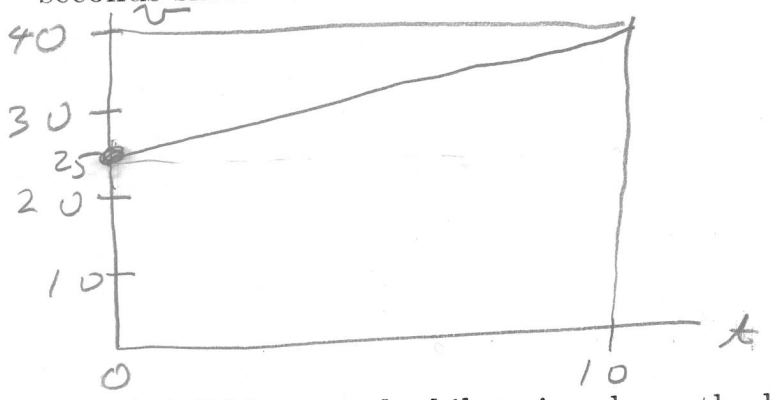
Quiz #34 Name: Key

You must show your work to get full credit.

(1) A bike rider is going at 25 ft/sec when he starts to go down a hill. It takes him 10 seconds reach the bottom of the hill and during this time his speed increases at a constant rate (that is constant positive acceleration) to 40 ft/sec.

(a) Draw a graph of the rider's speed, v, in ft/sec as a function of time, t, in seconds since he started down hill.

1 pt



2 pts (b) How far did he travel while going down the hill?

Distance traveled = Area under rate graph

Distance traveled: 325 ft

$= \text{Area}(\square) = \text{Area}(\triangle) + \text{Area}(\square)$ (15 over 10; 25 over 10)

$= \frac{1}{2}(10)(15) + 10(25) = 325$

(2) Find the maximum and maximizer of $f(x) = x(4a - x)$ on the interval $0 \leq x \leq 4a$ where a is a positive constant.

$f(x) = 4ax - x^2$

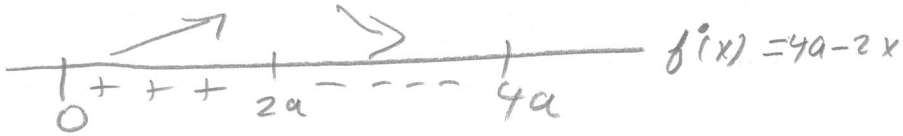
Maximizer: $2a$ 1 pt

$f'(x) = 4a - 2x = 0$

Implies

$x = \frac{4a}{2} = 2a$

Maximum: $4a^2$ 1 pt



So $x = 2a$ is maximizer

The maximum is

$f(2a) = 2a(4a - 2a)$

$= 2a(2a)$

$= 4a^2$