November 5

Given the velocity, how can you find:

* the instantaneous acceleration at a point? $v'(t)$
* the average acceleration? $\frac{\Delta v}{\Delta t} \rightarrow \frac{dv}{dt}$
* when the acceleration is positive or negative?

when velocity is increasing

November 5

Students will verbally explain how to find the exact area under a curve using definite integrals and relate it to position, velocity and acceleration

(using the words:
right, left, above, below, antiderivative...)

Given velocity, how do you know when the acceleration is positive? negative?

Positive when velocity is increasing (going up)

Negative when velocity is decreasing (going down)

Given velocity, how can you find the average acceleration?

$$\frac{\Delta v}{\Delta t} = \frac{v(b)-v(a)}{b-a}$$

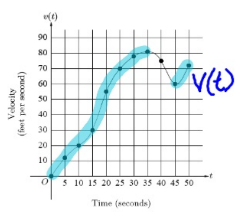
(slope of velocity through 2 points)

Given velocity, how can you find the instantaneous acceleration at a point?

derivative of velocity (at one point) $= v'(t)$

Given a table of values for velocity, how can you approximate the instantaneous acceleration at a point?

find the average acceleration near the point



t (seconds)	$v(t)$ (feet per second)
0	0
5	12
10	20
15	30
20	55
25	70
30	78
35	81
40	75
45	60
50	72

3. The graph of the velocity $v(t)$, in ft/sec, of a car traveling on a straight road, for $0 \le t \le 50$, is shown above. A table of values for $v(t)$, at 5 second intervals of time t, is shown to the right of the graph.

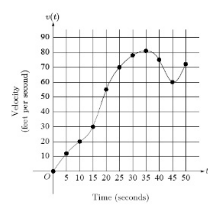
(a) During what intervals of time is the acceleration of the car positive? Give a reason for your answer.

$v'(t)$

v is increasing

$0 < t < 35$ and $45 < t < 50$

because velocity is increasing on these intervals



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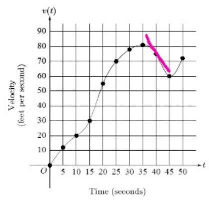
3. The graph of the velocity $v(t)$, in ft/sec, of a car traveling on a straight road, for $0 \le t \le 50$, is shown above. A table of values for $v(t)$, at 5 second intervals of time t, is shown to the right of the graph.

(b) Find the average acceleration of the car, in ft/sec^2, over the interval $0 \le t \le 50$.

slope - 2pts

a b

$$\frac{v(b)-v(a)}{b-a} = \frac{v(50)-v(0)}{50-0} = \frac{72-0}{50-0} = \frac{72}{50}$$



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3. The graph of the velocity $v(t)$, in ft/sec, of a car traveling on a straight road, for $0 \le t \le 50$, is shown above. A table of values for $v(t)$, at 5 second intervals of time t, is shown to the right of the graph.

ave slope → $v'(t)$

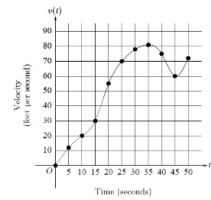
(c) Find one approximation for the acceleration of the car, in ft/sec^2, at $\boxed{t = 40}$. Show the computations you used to arrive at your answer.

near 40

$$\frac{v(45)-v(35)}{45-35} = \frac{-21}{10}$$

$$\frac{v(45)-v(40)}{45-40} = -3$$

$$\frac{v(40)-v(35)}{40-35} = \frac{-6}{5}$$



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10	20
15	30
20	55
25	70
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35	81
40	75
45	60
50	72

3. The graph of the velocity $v(t)$, in ft/sec, of a car traveling on a straight road, for $0 \le t \le 50$, is shown above. A table of values for $v(t)$, at 5 second intervals of time t, is shown to the right of the graph.

(d) using the midpoints of five subintervals of equal length. Using correct units, explain the meaning of this integral.

$$\frac{ft}{sec} \cdot \frac{sec}{1} = ft$$

Int	x-value	y-value (ft/sec)	width (sec)	Area
0→10	5	12	10	120
10→20	15	30	10	300
20→30	25	70	10	700
30→40	35	81	10	810
40→50	45	60	10	600

Total = 2530 ft

Distance traveled from 0 to 50 sec.