

## Integral as Net Change (Section 8.1)

\* Linear Motion: when  $v > 0$ , the particle moves RIGHT  
 $v < 0$ , the particle moves LEFT

\* Displacement = (rate of change) \* (time) OR  $\int v(t) dt$

\*\* New position = Initial position + displacement

\* Total distance = |displacement| OR  $\int |v(t)| dt$

ex:  $v(t) = 6 \sin 3t$   $0 \leq t \leq \pi/2$

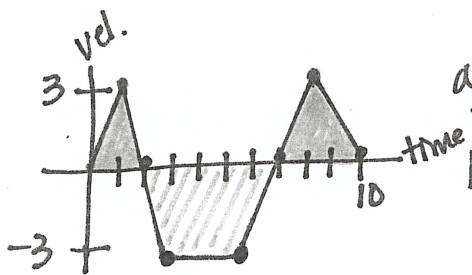
$v(t) < 0$   $v(t) > 0$   $v(t) = 0$

a) left, right, stopped?

b) displacement?

c) total distance?

#20



a) Final position?

b) Distance Traveled?

When  $t=0$ ,  $x=2$

\* pg 386 Example #4 (helps w/ #11 on HW)

$v_0 = 5$      $a(t) = 2.4t$  mph per second for 8 sec.

a) How fast is the car going when 8 sec are up?

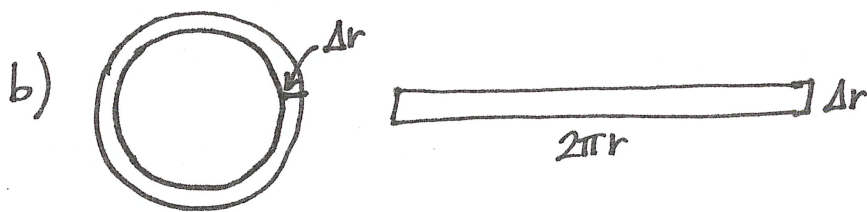
b) How far did it travel during those 8 sec?

#5  $v(t) = 5 \sin^2 t \cos t$   $0 \leq t \leq 2\pi$   $s(0) = 3$

- a) left, right, stopped
- b) Displacement  $\neq$  final position
- c) Total distance

#23 Pop Density =  $10,000(2-r)$

- a) If Pop density  $\rightarrow 0$ , find  $r$ .



c) Population =  $10,000(2-r)(2\pi r) \Delta r$  why?

d)  $\int_0^2 10,000(2-r)(2\pi r) dr$