7.1

* net change

a. stopped: $v(t) = 0$
   left: $v(t)$ neg
   right: $v(t)$ pos

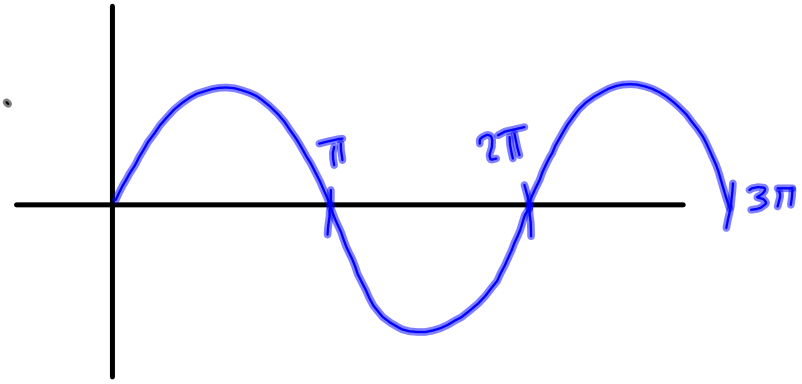
b. displacement: area under curve

c. final pos: $s(0)$ + disp

d. total dist: absolute value of area

1. $v(t) = \sin t \quad [0, 3\pi]$

a.



Stopped: $t = 0, \pi, 2\pi, 3\pi$ sec

left: $(\pi, 2\pi)$

right: $(0, \pi) \cup (2\pi, 3\pi)$

b. $\int_0^{3\pi} \sin t\,dt = -\cos t \Big|_0^{3\pi}$

$= -(\cos 3\pi - \cos 0)$

$= -(-1 - 1) = 2$ m.

c. $s(3\pi) = s(0) + \text{disp} = -2 + 2 = 0$ m

d. total distance: $3\int_0^{\pi} \sin t\,dt = 6$ m

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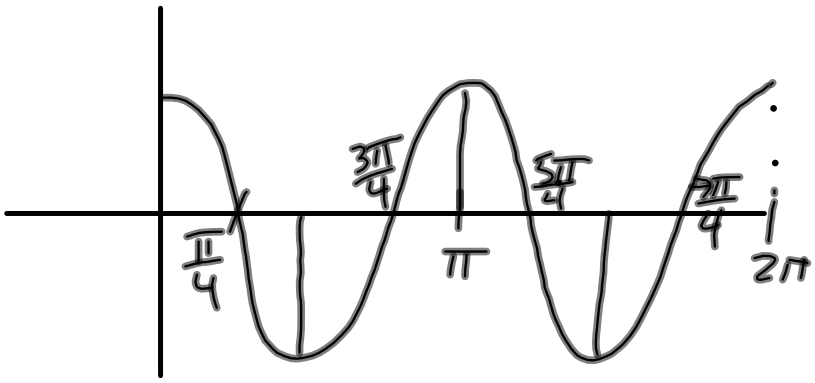
2. $v(t) = \cos 2t \quad [0, 2\pi]$

a.



Stopped: $t = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ sec

left: $(\frac{\pi}{4}, \frac{3\pi}{4}) \cup (\frac{5\pi}{4}, \frac{7\pi}{4})$

right: $(0, \frac{\pi}{4}) \cup (\frac{3\pi}{4}, \frac{5\pi}{4}) \cup (\frac{7\pi}{4}, 2\pi)$

b. $\int_0^{2\pi} \cos 2t\,dt = \frac{1}{2}\sin 2t \Big|_0^{2\pi}$

$= \frac{1}{2}(\sin 4\pi - \sin 0) = \frac{1}{2}(0-0)$

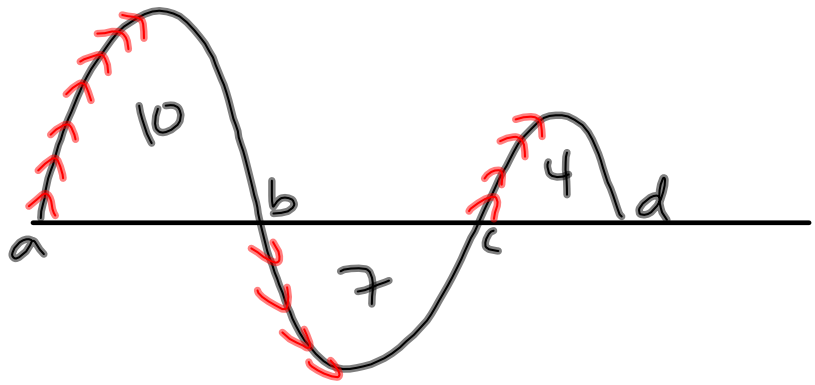
$= 0$ m.

c. $s(2\pi) = -2 + 0 = -2$ m

d. $8\int_0^{\frac{\pi}{4}} \cos 2t\,dt = 8\left(\frac{1}{2}\sin 2t\right)\Big|_0^{\frac{\pi}{4}}$

$= 4(\sin\frac{\pi}{2} - \sin 0) = 4$ m.

4. $v(t)$ $s(0)=5$



a. $10-7+4=7$ ft.

b. total dist: $10+|-7|+4=21$ ft.

c. $s(b)=s(0)+\text{disp}=5+10=15$ ft.

$s(c)=5+(10-7)=8$ ft.

$s(d)=5+7=12$ ft

d. acceleration: $v'(t)$: slope of $v(t)$

greatest: steepest pos slope: a

least: steepest neg slope: d

zero: max/min of $v(t)$

e. speeding up: $v(t)$ & $a(t)$ same sign

slowing down: $v(t)$ & $a(t)$ opp. sign

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5. $C(t) = 3.9 - 2.4\sin\left(\frac{\pi t}{12}\right)$

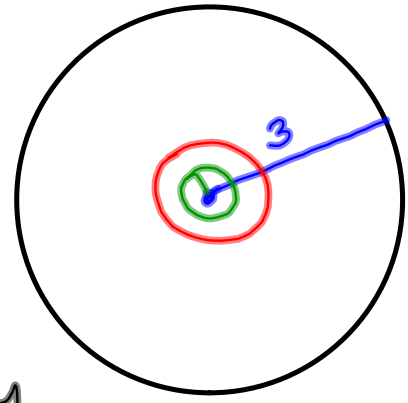
$$\int_0^{24} \left(3.9 - 2.4\sin\left(\frac{\pi t}{12}\right)\right) dt$$

$$= 93.6 \text{ kw-hrs.}$$

6. $D(r) = 5000(3 - r)$

A. $0 = 5000(3 - r)$

$r = 3$ mi.



B.

$P = \text{Area} \cdot \text{density}$

$$\int_0^3 2\pi r \cdot 5000(3 - r)\, dr$$

$\vdots$

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