

Sec 3.8 day 1 page 237 (1,5-7)

1) $S(t) = t^3 - 12t^2 + 36t$

a) $v(t) = 3t^2 - 24t + 36$

b) $v(3) = -9 \text{ ft/s}$

c) $v(t) = 0$ so $3(t^2 - 8t + 12) = 0$
 $3(t-2)(t-6) = 0$

at $t=2$ and $t=6$.

d) $v(t) > 0$ so $t-2 > 0$ and $t-6 > 0$

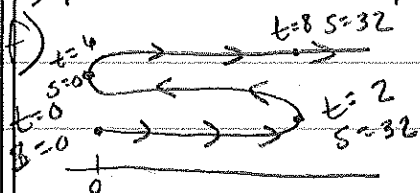
$t > 2$ $t > 6 \Rightarrow (6, \infty)$

and $t-2 < 0$ and $t-6 < 0$

$t < 2$ $t < 6 \Rightarrow (0, 2)$

$\therefore (0, 2) \cup (6, \infty)$

e) $|s(2) - s(0)| + |s(6) - s(2)| + |s(8) - s(6)| = 96 \text{ ft}$



g) $a(t) = 6t - 24$

$a(3) = -6 \text{ ft/sec}^2$

i) $a(t) > 0$ when $6t - 24 > 0$ $t > 4$ on $(4, \infty) +$

$a(t) < 0$ when $6t - 24 < 0$ $t < 4$ on $(0, 4) -$

$v(t) +$ on $(0, 2) + (6, \infty)$

$v(t) -$ on $(2, 6)$

speeding up on $(2, 4)$ and $(6, \infty)$

slowing down on $(0, 2)$ and $(4, 6)$

5) speeding up on $(0,1)$ and $(2,3)$
slowing down on $(1,2)$

6) speeding up on $(1,2)$ and $(3,4)$
slowing down on $(0,1)$ and $(2,3)$

6) a) speeding up $CU \uparrow$ and $CD \downarrow$
so $(1,2)$ and $(3,4)$
slowing down on $(0,1)$ and $(2,3)$

7) $s = t^3 - 4.5t^2 - 7t \quad t \geq 0$

a) $v(t) = 3t^2 - 9t - 7$

$$5 = 3t^2 - 9t - 7$$

$$3t^2 - 9t - 12 = 0$$

$$3(t^2 - 3t - 4) = 0$$

$$3(t-4)(t+1) = 0$$

\therefore The particle reaches
a velocity of 5 m/s
at 4 seconds.

b) $a(t) = 6t - 9$

$$a(t) = 0 \text{ when } 6t - 9 = 0$$

$$\text{or } t = \frac{3}{2}$$

The acceleration changes from negative to positive, so velocity changes from \downarrow to \uparrow which means there is a min at 1.5 s.