

P166

① a)  $s' = v(t) = 2t - 10$

b)  $v(3) = -4 \text{ ft/sec}$

c)  $v(t) = 0$   
 $2t - 10 = 0$

$t = 5 \text{ sec}$

d)  $v(t) > 0$

$2t - 10 > 0$

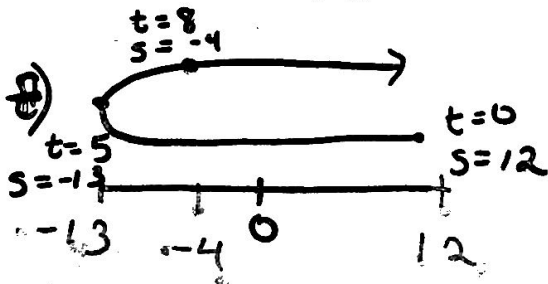
$t > 5 \text{ sec}$

e)  $[0, 5] [5, 8]$

$|f(5) - f(0)| = |-13 - 12| = 25 \text{ ft}$

$|f(8) - f(5)| = |-4 - (-13)| = 9 \text{ ft}$

Total 34 ft



f)  $a(t) = 2$

t	2
v	-   +
a	+   +

Speeding up  
(2, ∞)

② a)  $v(t) = 3t^2 - 18t + 15$

b)  $v(3) = -12 \text{ ft/sec}$

c)  $v(t) = 0, t = 1 \text{ or } 5 \text{ sec}$

d)  $v(t) > 0, 0 \leq t < 1 \text{ or } t > 5$

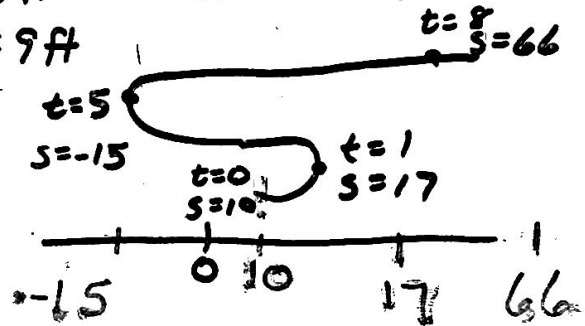
e)  $[0, 1]$  7  
 $[1, 5]$  32  
 $[5, 8]$  81

f)  $a(t) = 6t - 18$   
 $a(t) = 0, t = 3$

t	1	3	5
v	+   -   +		
a	-   -   +		

Speeding up  
(1, 3) (5, ∞)

total = 120 ft



③ a)  $v(t) = 3t^2 - 24t + 36$

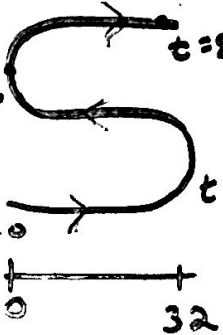
b)  $v(3) = -9 \text{ ft/sec}$

c)  $v(t) = 0, t = 2 \text{ or } 6 \text{ sec}$

d)  $v(t) > 0, 0 \leq t < 2, t > 6$

e)  $[0, 2]$  32  
 $[2, 6]$  32  
 $[6, 8]$  32

total = 96 ft



f)  $a(t) = 6t - 24$   
 $a(t) = 0, t = 4$

t	2	4	6
v	+   -   +		
a	-   -   +		

Speed up  
(2, 4) (6, ∞)

④ a)  $v(t) = 4t^3 - 4$

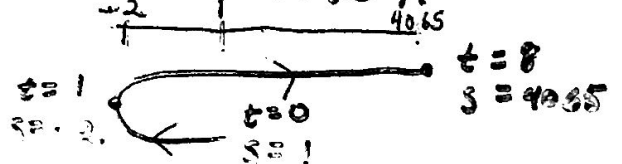
b)  $v(3) = 104 \text{ ft/sec}$

c)  $t = 1 \text{ sec}$

d)  $t > 1$

e)  $[0, 1]$  3 ft  
 $[1, 8]$  4067

total = 4070 ft



f)  $a(t) = 12t^2$   
 $a(t) = 0, t = 0$

t	1
v	-   +
a	+   +

Speed up  
(1, ∞)

5

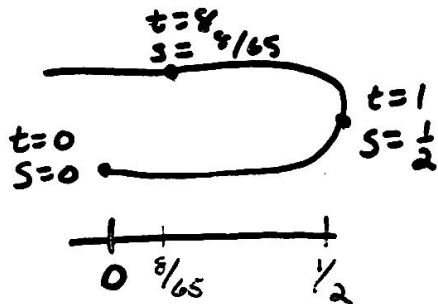
a)  $v(t) = \frac{1-t^2}{(t^2+1)^2}$

b)  $v(3) = -\frac{2}{25}$  ft/sec

c)  $t = 1$  sec  
(time will not be neg)

d)  $0 \leq t < 1$

e)  $[0, 1] \quad \frac{1}{2}$  ft  
 $[1, 8] \quad \frac{49}{130}$  ft  
total =  $\frac{57}{65}$  ft



$v(t) = \frac{(t^2+1)^2 - (2t)(2t)(t^2+1)}{(t^2+1)^4}$   
 $v(t) = 0 \quad t = \sqrt{3}$   
speed up  
(1,  $\sqrt{3}$ )

t	1	$\sqrt{3}$
v	+	-
a	-	+

6) a)  $s(t) = 3t^{3/2} - 35t^{1/2} + 90t^{-1/2}$   
 $v(t) = \frac{15}{2}t^{1/2} - \frac{105}{2}t^{-1/2} + 45t^{-3/2}$

b)  $v(3) = -15\sqrt{3}$  ft/sec

c)  $\frac{15}{2\sqrt{t}}(t-1)(t-6) = 0 \quad t = 1 \text{ or } 6$  sec

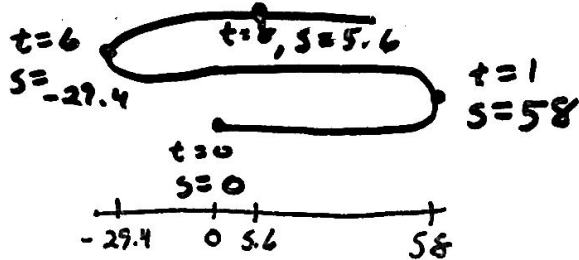
d)  $0 \leq t < 1, t > 6$

e)  $[0, 1] \approx 58$  speed up  
 $[1, 6] \approx 87.39$   
 $[6, 8] \approx 35.05$

f)  $a(t) = 0, t = 7.77$

t	1	6	7.77
v	+	-	+
a	-	-	+

total = 180.44 ft



7)  $v(t) = 3t^2 - 9t - 7 = 5$   
 $t = 4$  or  $-1$   
4 sec

8)  $v(t) = 5 + 6t \quad 5 + 6t = 35$   
 $v(2) = 17$  m/s  $t = 5$  sec

9)  $v(t) = 10 - 1.66t$   
 $v(3) = 5.02$  m/s

$10t - .83t^2 = 25$   
 $t \approx 3.54$  or  $8.51$   
rise fall

$v(3.54) \approx 4.12$  m/sec

10)  $v(t) = 80 - 32t = 0$   
 $t = \frac{5}{2}$

max height  $s(\frac{5}{2}) = 100$  ft

$96 = 80t - 16t^2$   
 $t = 2$  or  $6$

$v(2) = 16$  ft/sec way up  $v(6) = -16$  ft/sec way down