U4Q2

1. The following graph shows a particle's position as a function of time t.

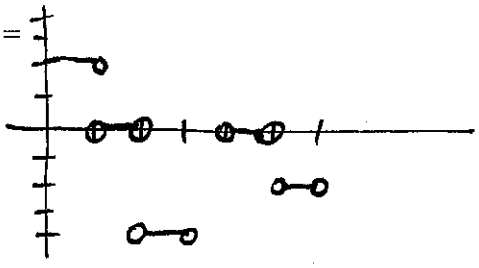
s(t) =

a. When is the particle moving to the left? Right? Standing still?

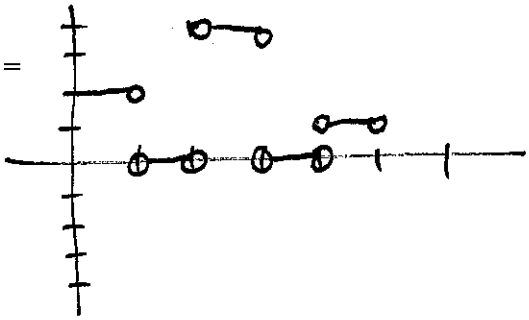
Right: (0, 1) Left: (2, 3) (5, 6) Still: (1, 2) (3, 5)

b. Graph the particle's velocity and speed (where defined).

velocity =



speed =



c. When is the particle moving at the greatest velocity? greatest speed?

Greatest velocity: (2, 3) (0, 1) greatest speed: (2, 3)

d. Find the displacement of the particle during the first 3 seconds.

$\Delta s = s(3) - s(0) = -2 - 0 = \boxed{-2 \text{ cm}}$

2. The position function is graphed below. List all points which appear to meet the stated conditions. Note that point K is a vertical tangent.

a. $a(t) = 0$ B, D, G, (K)

b. $v(t) > 0$ but finite
D, J, (K)

c. $v(t) > 0$ and $a(t) > 0$
J (K)

d. $v(t) = 0$ and $a(t) > 0$
C, I

e. $v(t) = 0$ and $a(t) < 0$
A, E

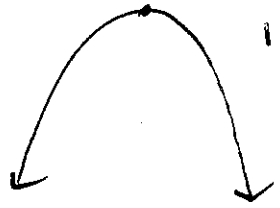
f. $v(t) < 0$ and $a(t) < 0$
F

3. A rock thrown vertically upward from the surface of the moon at a velocity of 24 m/sec reaches a height of $s = 24t - 0.8t^2$ meters in t seconds.

a. Find the rock's velocity and acceleration as functions of time.

1 v(t) = $24 - 1.6t$ 1 a(t) = -1.6

b. How long did it take the rock to reach its highest point?



1 $v(t) = 24 - 1.6t = 0$

$\frac{-1.6t}{-1.6} = \frac{-24}{-1.6}$

$t =$ 15 sec $= 24/1.6$

Use the Mean Value Theorem to find point c.

4. $f(x) = \frac{x+1}{x}$ on $[0.5, 2]$ $\frac{f(2) - f(.5)}{2 - .5} = f'(x)$

3

$\frac{\frac{3}{2} - \frac{3/2}{.5}}{3/2} = \frac{x(1) - (x+1)}{x^2}$

$\frac{\frac{3}{2} - \frac{6}{2}}{3/2} = \frac{x - x - 1}{x^2}$

$\frac{-3/2}{3/2} = \frac{-1}{x^2} \rightarrow$

$-1 = \frac{-1}{x^2}$

$+x^2 = 1$

$x = 1, -1$

$x = 1$

5. $h(x) = \sin x$ on $[0, \pi]$

3 $\frac{f(\pi) - f(0)}{\pi - 0} = \cos x$

$\frac{\sin \pi - \sin 0}{\pi} = \cos x$

$\frac{0 - 0}{\pi} = \cos x$

$0 = \cos x \rightarrow$ $x = \pi/2$

6. **Explain** whether or not you can use the MVT on g(x).

2 $g(x) = 3x^{1/2} + 4$ $[1, 4]$

$g'(x) = \frac{3}{2} x^{-1/2} = \frac{3}{2} \cdot \frac{1}{\sqrt{x}}$

yes