APCalculusAB
Monday,October21,2013

Bellwork...ontheboard

A particle is moving along the x-axis with velocity $v(t) = (2t-3)^2(t-5)$. At what time(s) in the open interval (0, 6) does the particle change direction? Explain fully.

No more quizzes/grades on Quarter 1.
I have already dropped your lowest grade.
SOME OF YOU STILL OWE ME ERROR ANALYSES!

$v(t) = 0$

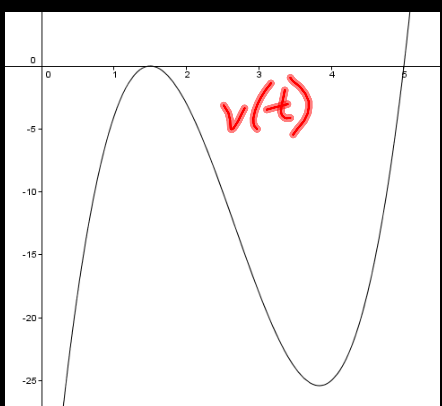
$t = \frac{3}{2}$

$t = 5$

$-\quad 0 \quad - \quad - \quad 0 \quad +$

$0 \quad \frac{3}{2} \quad 3 \quad 5 \quad 6$

The particle changes direction @ $t = 5$ because $v(t)$ changes sign @ $t = 5$. The particle does not change direction @ $t = 3/2$ bc $v(t)$ does not change sign.



④ $s(t) = t + \frac{9}{t+1} + 1$

$s(t) = t + 9(t+1)^{-1} + 1$

$s'(t) = v(t) = 1 - 9(t+1)^{-2} = 1 - \frac{9}{(t+1)^2}$

$s''(t) = v'(t) = a(t) = 18(t+1)^{-3} = \frac{18}{(t+1)^3}$

Set $v(t)=0$ to determine direction of motion

$1 - \frac{9}{(t+1)^2} = 0$

$\frac{1}{1} = \frac{9}{(t+1)^2}$

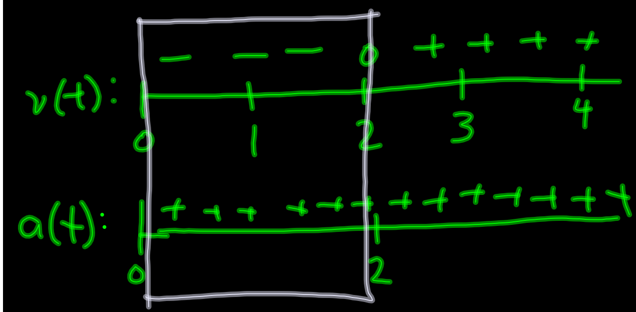
$(t+1)^2 = 9$

$t+1 = \pm 3$

$t = -1 \pm 3 \rightarrow 2, \cancel{-4}$

$a(t) = 0 \rightarrow \frac{18}{(t+1)^3} = 0$ never

For $t \geq 0$, $a(t) > 0$.



$v(t) < 0$ on $(0,2)$ ∴ particle is moving left.

$a(t) > 0$ on $(0,2)$ ∴ Since v & a have diff. signs ~~$v(t)<0$ & $a(t)>0$~~, the particle is slowing down.

$v(t) > 0$ on $(2, \infty)$ ∴ particle is moving Right.

$a(t) > 0$ on $(2, \infty)$.

Since $v(t) > 0$ & $a(t) > 0$, the particle is speeding up.

The particle is spdng up bc the v & a have same sign.

$$\frac{d}{dx}\left[3x^2\right] = \underset{c}{3}\cdot\underset{u'}{2x} = 6x$$

$$\frac{d}{dx}\left[c\cdot u\right] = c\cdot u'$$

$$\frac{d}{dx}\left[u \pm v\right] = u' \pm v'$$

Ex.

$$\frac{d}{dx}\left[x^2 + \frac{1}{3}x^3\right] = 2x + x^2$$

$$\frac{d}{dx}\left[uv\right] = u\cdot v' + v\cdot u'$$

$$\frac{d}{dx}\left[\frac{u}{v}\right] = \frac{v\cdot u' - u\cdot v'}{v^2}$$

$$\frac{d}{dx}\left[c\right] = 0$$

$$\frac{d}{dx}\left[u^n\right] = n\cdot u^{n-1}\cdot u'$$

Ex. $\frac{d}{dx}\left[(3x-1)^4\right] = 4(3x-1)^3\cdot 3$

$$\frac{d}{dx}\left[x\right] = 1$$

$$\frac{d}{dx}\left[\sin u\right] = u'\cdot\cos u$$

$$\frac{d}{dx}\left[\cos u\right] = -u'\sin u$$

$$\frac{d}{dx}\left[\tan u\right] = u'\cdot\sec^2 u$$

$$\frac{d}{dx}\left[\cot u\right] = -u'\csc^2 u$$

$$\frac{d}{dx}\left[\sec u\right] = u'\sec u\tan u$$

$$\frac{d}{dx}\left[\csc u\right] = -u'\csc u\cot u$$