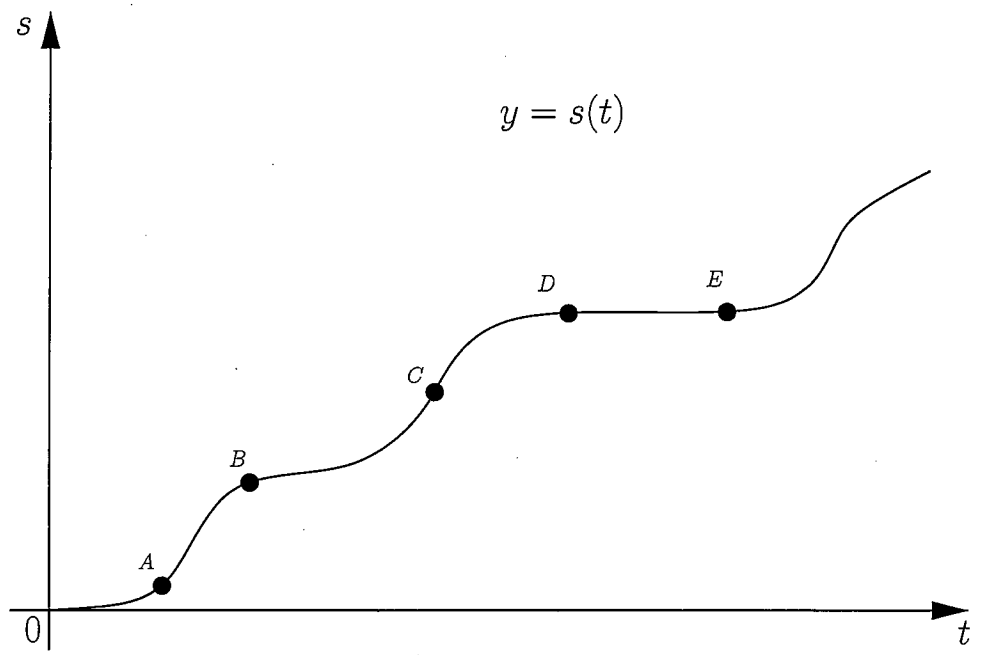
Math 121 S09N01 - Quiz 3 Name: SOLUTIONS.
Feb 6 2009 Stu#:

(1) [5 points] The graph below shows the position function $y = s(t)$ of a car. Here s is in metres and t in seconds.



(a) What was the initial velocity of the car?

Initial velocity is $s'(0) = 0$ $\frac{m}{s}$.

(b) Was the car going faster at B or at C? Why?

C : slope of tangent line at C is greater.

(c) Was the car slowing down, speeding up, or neither at A? at B? at C?

A: Speeding up : slopes of tangent lines are increasing.

B: Slowing down : slopes of tangent lines are decreasing.

C: Neither : slopes of tangent lines increase to left of C, but decrease to right of C.

(d) Based on the graph, what can you say about the motion of the car between D and E?

Car has stopped : Velocity = $s'(t) = 0$ between D & E.

(2) [5 points] Find the derivative of

$$y = \frac{x^2 + 4x + 3}{\sqrt{x}} = x^{3/2} + 4x^{1/2} + 3x^{-\frac{1}{2}}$$

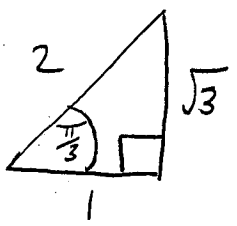
$$\therefore \frac{dy}{dx} = \frac{3}{2}x^{\frac{1}{2}} + 4\left(\frac{1}{2}x^{-\frac{1}{2}}\right) + 3\left(-\frac{1}{2}x^{-\frac{3}{2}}\right)$$

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

(3) [5 points] Find the equation of the tangent line to $y = 6\cos(x)$ at the point $(\pi/3, 3)$.

$$y' = -6\sin(x)$$

$$y'\Big|_{x=\frac{\pi}{3}} = -6\sin\left(\frac{\pi}{3}\right) = -6\left(\frac{\sqrt{3}}{2}\right) = -3\sqrt{3}.$$



$\therefore$ Equation is $y - 3 = -3\sqrt{3}\left(x - \frac{\pi}{3}\right)$.

or $y = -3\sqrt{3}x + \sqrt{3}\pi + 3$.