

Calculus Warm Up

day after section 3.5

Find $\frac{dy}{dx}$

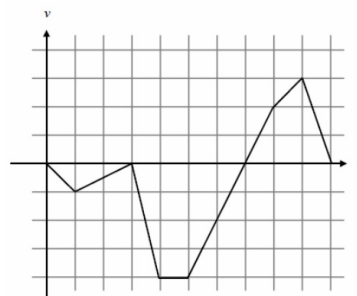
1) $y = \frac{2}{x^3} + 3 \sin x$

2) $y = (2x + 1) \tan x$

3) $y = \frac{\cot x}{3x - \pi}$

4) Write the equation of the line tangent to the graph of $y = \sqrt{2} \sin x$ @ $x = \frac{3\pi}{4}$

Suppose the graph shows the velocity of a particle moving along the x-axis at a rate of meters per second



- Which way does the particle move first?
- When does the particle stop?
- When does the particle change direction?
- When is the particle moving left?
- When is the particle moving right?
- When is the particle speeding up?
- When is the particle slowing down?
- When is the particle moving the fastest?
- When is the particle moving at a constant speed?

Calculus Warm Up

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Find $\frac{dy}{dx}$

$$1) y = \frac{2}{x^3} + 3 \sin x$$

$$y = 2x^{-3} + 3 \sin x$$

$$y' = -6x^{-4} + 3 \cos x$$

$$2) y = (2x+1) \tan x$$

$$y' = (2x+1) \sec^2 x + \tan x (2)$$

$$y' = 2x \sec^2 x + \sec^2 x + 2 \tan x$$

$$3) y = \frac{\cot x}{3x - \pi}$$

$$y' = \frac{(3x - \pi)(-\csc^2 x) - \cot x(3)}{(3x - \pi)^2}$$

$$y' = \frac{-3x \csc^2 x + \pi \csc^2 x - 3 \cot x}{(3x - \pi)^2}$$

4) Write the equation of the line tangent to the graph of $y = \sqrt{2} \sin x$

@ $x = \frac{3\pi}{4}$

pt. $(\frac{3\pi}{4}, \sqrt{2} \sin(\frac{3\pi}{4}))$
 $(\frac{3\pi}{4}, 1)$

Slope
 $y' = \sqrt{2} \cos x$
 $y'(\frac{3\pi}{4}) = \sqrt{2} \cos \frac{3\pi}{4}$
 $= \sqrt{2}(-\frac{1}{\sqrt{2}})$

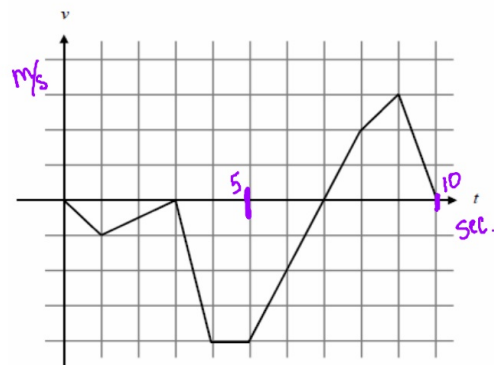
$$y'(\frac{3\pi}{4}) = -1$$

$$y - 1 = -1(x - \frac{3\pi}{4})$$

Look at the next page

Suppose the graph shows the velocity of a particle moving along the x-axis at a rate of meters per second

$$v' = 0$$



a) Which way does the particle move first?

$$\text{left, } v(t) < 0$$

b) When does the particle stop?

$$t = 0, 3, 7, 10, \text{ b/c } v(t) = 0$$

c) When does the particle change direction?

$$t = 7, \text{ b/c } v(t) \text{ changes signs}$$

d) When is the particle moving left?

$$t = (0, 3) \cup (3, 7) \text{ b/c } v(t) < 0$$

e) When is the particle moving right?

$$(7, 10) \text{ b/c } v(t) > 0$$

f) When is the particle speeding up?

$$(0, 1) \cup (3, 4) \cup (7, 9) \text{ b/c b/c } v(t) \text{ and } a(t) \text{ have different signs}$$

g) When is the particle slowing down?

$$(1, 3) \cup (5, 7) \cup (9, 10) \text{ b/c } v(t) \text{ and } a(t) \text{ have the same sign}$$

h) When is the particle moving the fastest?

$$(4, 5)$$

i) When is the particle moving at a constant speed?

$$(4, 5) \text{ b/c } a = 0$$