2/17 - That pesky 3.5 #88 still could use some discussion.

The part *c* should be done the way I originally wanted to do part *b*. Here's how to attack part *c*:

$$\sin|x| = \begin{cases} \sin x & \text{if } x \geq 0 \\ \sin(-x) & \text{if } x < 0 \end{cases} = \begin{cases} \sin x & \text{if } x \geq 0 \\ -\sin x & \text{if } x < 0 \end{cases}, \text{since sine is odd.}$$

$|\sin x|$

$\sin|x|$

For $|\sin x|$ in part *b*, this approach was not very fruitful, because $\sin x$ changes from positive to negative every π radians. But when it's an $|x|$ INside the sine function, you just have two intervals to worry about. My instincts on part b were correct for part *c*, but not for part *b*. The textbook's approach to part *b* cleverly followed the trick for part *a*.

Hat-tip to Terry Shao for asking this one early and then asking about it again.

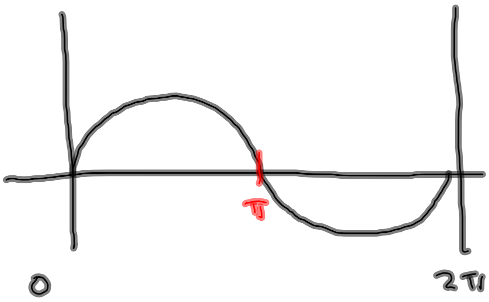
§3.7 Do #20 instead of #16.

The graph of $|\sin x|$ & its derivative's graph was an issue last time.

The issue was concavity

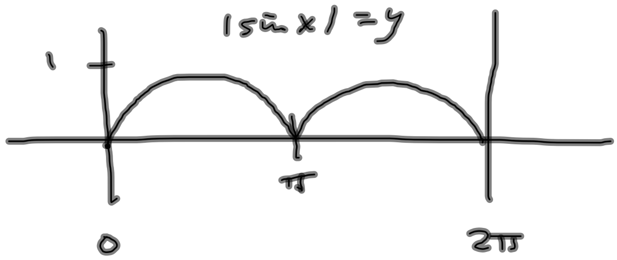
Isn't $\frac{d}{dx}[\sin x] = \cos x$?

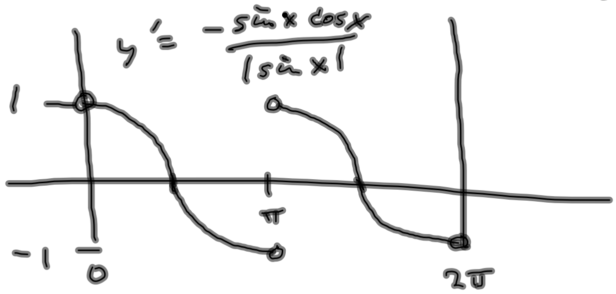
$\frac{d}{dx}[-\sin x] = -\cos x$?



$\sin x$

Too steep @ $x = n\pi$, $n \in \mathbb{Z}$





$\frac{d}{dx}[\sin x]$

$= \cos x$

Like 3.6 #4

3.5 #23

a. $\sin x - \sqrt[3]{y} = 37$

$\sin x - (y)^{\frac{1}{3}} = 37$

$\cos x - \frac{1}{3} y^{-2/3} \cdot y' = 0$

$-\frac{1}{3} y^{-\frac{2}{3}} y' = -\cos x$

$y' = \dfrac{-\cos x}{-\frac{1}{3} y^{-2/3}} = (\cos x)(3y^{\frac{2}{3}})$

$= 3\sqrt[3]{y^2}\cos x$

b. $\sin x - \sqrt[3]{y} = 37$

$-\sqrt[3]{y} = 37 - \sin x$

$\sqrt[3]{y} = \sin x - 37$

$\boxed{y = (\sin x - 37)^3}$ → The expression for y

$y' = 3(\sin x - 37)^2 (\cos x)$

c. Compare explicit & implicit sol'ns.

$y' = 3\cos x)(\sin x - 37)^2$

$y' = 3\sqrt[3]{y^2}\cos x$

$= 3\sqrt[\cancel{3}]{((\sin x - 37)^{\cancel{3}})^2}\cos x$

$= 3(\sin x - 37)^2 \cos x$

$(x+h)^2 =$

$x^2 + \underbrace{xh + hx}_{} + h^2$

§3.5 # 23

3.5 #35 has a sign wrong in Student Solutions Manual.

$y = \sin(\underset{f}{x}\ \underset{g}{\cos x})$

$$y' = \boxed{\cos(x \cos x)\left[\underset{f'}{1}\cdot \underset{g}{\cos x} + \underset{f}{x}\,\underset{g'}{(-\sin x)}\right]}$$

Going farther on tests is time waste. Trying to manipulate it to match the book answer is good exercise.

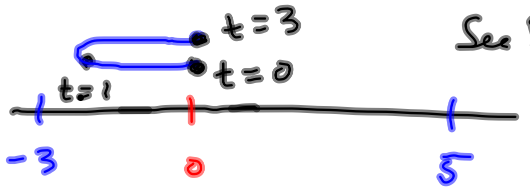
Why multiply by derivative of whats inside?

The bakery's income is a function of the number of loaves of bread it sells.
The number of loaves of bread it sells is a function of the amount of flour used.
The amount of flour used is a function of the amount of wheat grain purchased.

$$I(B(F(w)))$$

$$\frac{dI}{dw} = \frac{dI}{dB} \cdot \frac{dB}{dF} \cdot \frac{dF}{dw}$$

s(t) = position (Distance from 0 on the # line.



See Fig 2

$s(t) = t^2 - 3t$

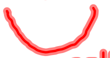
$s(0) = 0$

$s(1) = -2$

$s(3) = 0$

It's this sort of thing.

$a>0$

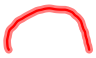


concave up

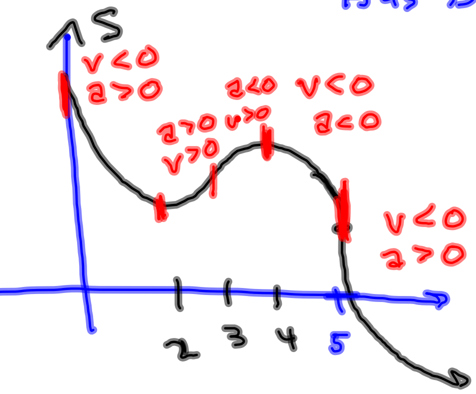
Speed ≠ Velocity

Has Direction

$a<0$



concave down



s = position (distance from 0)

Velocity = slope

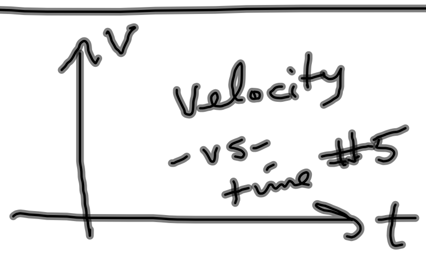
Acceleration =

when is the particle speeding-up?

$(2,3) \cup (4,5)$

When's it slowing-down?

$(0,2) \cup (3,4) \cup (5,\infty)$



See: #s 5,6 §3.7.