

Mon 8/21: Preliminaries

I. Algebra

$$A. (i) \frac{6+3}{3} = \frac{3(2+1)}{3} = 3, \text{ or } \frac{6+3}{3} = \frac{6}{3} + \frac{3}{3} =$$

$$2+1 = 3.$$

$$(ii) \text{ But } \frac{5+3}{3} = \frac{5}{3} + 1.$$

$$(iii) \frac{xy+y}{y} = \frac{y(x+1)}{y} = x+1, \text{ or}$$

$$\frac{xy+y}{y} = \frac{xy}{y} + \frac{y}{y} = x+1.$$

$$\frac{2xy+3y}{y} = \frac{y(2x+3)}{y} = 2x+3.$$

$$\frac{x+y}{y} - 1 = ?$$

$$\frac{xy+y}{y} - 1 = ?$$

$$B. \sqrt{2^2+3^2} = \sqrt{4+9} = \sqrt{13} \neq 2+3.$$

$$\sqrt{x^2+y^2}, \sqrt{x^2+2xy+y^2}, \sqrt{x^2-2xy+y^2}$$

$$C. -(-5) = ? \quad -x < 0? \quad \sqrt{(-5)^2} = ?$$

$$\sqrt{x^2} = ?$$

II. Logic of conditional statements:

Ex. If Sid is a fish, then Sid can swim.

Converse, contrapositive, $\Delta \Rightarrow \odot$

$$T/F: x=2 \Rightarrow x^2=4, \quad x^2=4 \Rightarrow x=2,$$

$$x^2 \neq 4 \Rightarrow x \neq 2$$

What is contrapositive of $x^2=4 \Rightarrow x=2$.

Solve: $x = \sqrt{x+2}$. Discuss!
ives 8/22

III. Functions and inversion:

Let $y = x+1$. Is y a function of x ?

Is x a function of y ?

$$y = f(x) = x+1 \Rightarrow x = f^{-1}(y) = y-1.$$

Note that formula is only a pattern;
function is a relationship.

Let $y = x^2$. Same questions.

Restriction of domain +
(Injective, surjective, bijective. Right + left inverses!) range.

$$\text{If } \sin : \left[-\frac{\pi}{2}, \frac{\pi}{2}\right] \rightarrow [-1, 1],$$

$$\text{Then } \sin^{-1} : [-1, 1] \rightarrow \left[-\frac{\pi}{2}, \frac{\pi}{2}\right].$$

$$\sin^{-1}(\sin(\frac{3\pi}{4})) = ? \quad \sin(\sin^{-1}(\frac{1}{2})) = ?$$

$$\sin^{-1}(\sin(\frac{\pi}{4})) = ? \quad \sin(\sin^{-1}(x)) = ?$$

We are really choosing a right inverse!

Wed. 8/23 O. Note why right + left inverse must be equal

I Range of other inverse trig. functions:

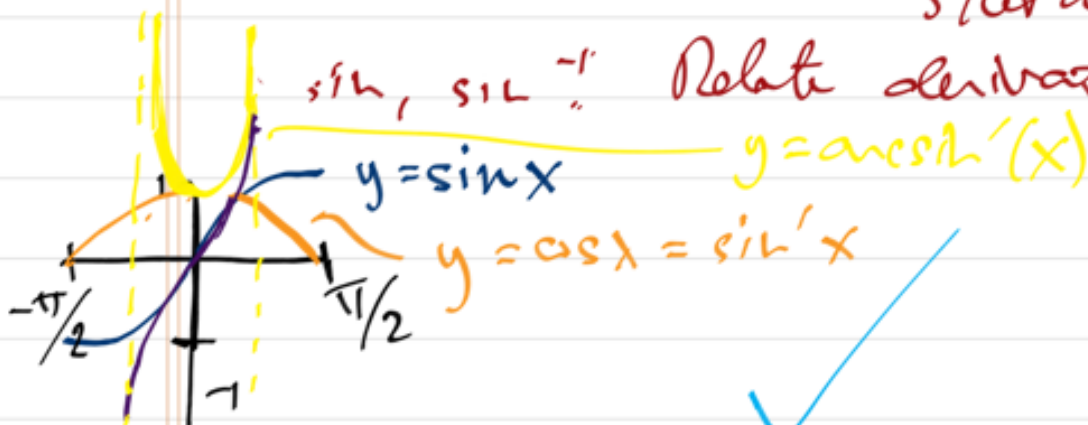
✓ $R(\cos^{-1}) = [0, \pi]$, $R(\tan^{-1}) = \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$.

II. Derivatives, Sketch derivatives
of \sinh , $y = x^2$ at this point
remind them how to show
 $y' = 2x$.



Sketch graphs of

\sinh , \sinh^{-1} Relate derivatives



$y = \operatorname{arcsinh} x = \sinh^{-1} x$

Before we go on, here is an exercise:

What is $\cos(\sinh^{-1}(\frac{3}{5}))$? Hint: draw a triangle: 5



✓ III. Implied differentiation
to solve for derivative
of an inverse function;

Assn. 1, Part 2, Problem 1. ✓

Thurs. 8/24 I. Revi

Review of integration, logarithms,
exponents, FTC.

Note: Bring in old log table at appropriate
time!

Slides 1-13.

See dean esp
next page!

Thurs. 8/24: Review ... continued,

Slides 14-27.

Thurs. 8/24: Catch up. Work
Assn. 1 in class.

Fri 8/25: Questions; continue working
Assn. 1.

Thurs.
8/24 I. Review of $\frac{d}{dx}$ derivative and
meaning of dy . ✓

II. Review of integration and FTC:
Slide 1-13. (Slide 1-9 over)

Fri.
8/25 I. Review, cont. Include logarithms.
Slide 14-27

II. Work on Assn. 1, Part I.