

## question

3 views

## Daily Challenge 8.1

This daily challenge has two questions, so let's split it into a part due at noon and a part due by midnight.

You are welcome to either enter your solutions into the student response on Piazza, or directly into the consolidation document, whichever you find easier.

• **Due: Thursday 6/14 at 12:00 noon Eastern.**

Answer the quick calculations (problem 1) in the [consolidation document](#). They are copied below, for convenience.

- (a) Evaluate  $\sin\left(\pi \sin\left(\frac{\pi}{6}\right)\right)$ ,  $\tan(21\pi)$ , and  $\sec\left(-\frac{7\pi}{2}\right)$ .
- (b) Find the value of  $\log_5\left(\frac{(125) \cdot (625)}{(25)}\right)$ .
- (c) Suppose that  $a < b < c < d$  are real numbers. Write the set  $(a, c) \cap (b, d)$  as an interval.
- (d) What are the domain and range of  $f(x) = \sqrt{1-x}$ ?

• **Due: Thursday 6/14 at 11:59 pm Eastern.**

Answer question 7 in the consolidation document, which I have reproduced below.

- (a) Let  $A, B, C$  be sets. Prove that  $A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C)$

[ Scaffold: show that each set is a subset of the other. ]

- (b) Let  $f$  be a function with  $A, B \subseteq \text{Dom}(f)$ . Is it true that  $f(A \cap B) = f(A) \cap f(B)$ ? If so, prove it (stating the precise definition of image in your answer). If not, give a counterexample.

- (c) Let  $f$  be a function with  $C, D \subseteq \text{Cod}(f)$ . Is it true that  $f^{-1}(C \cap D) = f^{-1}(C) \cap f^{-1}(D)$ ? If so, prove it (stating the precise definition of inverse image in your answer). If not, give a counterexample.

daily\_challenge

Updated 10 months ago by Christian Ferko

**the students' answer,** where students collectively construct a single answer

Logan Pachulski:

Part 1:

- Answers for a (These are all exercises, so I'm gonna be lazy and not include words):
  - $\sin\left(\pi \sin\left(\frac{\pi}{6}\right)\right) = \sin\left(\frac{1}{2}\pi\right) = 1$
  - $\tan(21\pi) = \frac{\sin(21\pi)}{\cos(21\pi)} = \frac{0}{-1} = 0$
  - $\sec\left(-\frac{7\pi}{2}\right) = \frac{1}{\cos\left(-\frac{7\pi}{2}\right)} = \frac{1}{0}$ , this is undefined!
- b:
  - By the logarithm quotient rule,  $\log_5\left(\frac{125 \times 625}{25}\right) = \log_5(125 \times 625) - \log_5(25)$ , and by the logarithm quotient rule the first logarithm simplifies to create the expression  $\log_5(125) + \log_5(625) - \log_5(25)$ . Since  $5^2 = 25$ ,  $5^3 = 125$ , and  $5^4 = 625$ , this can finally simplify to  $3 + 4 - 2 = 5$
- c:
  - $(b, c)$
- d:
  - Domain:  $(-\infty, 1]$
  - Range:  $[0, +\infty)$

Updated 10 months ago by Logan Pachulski

**the instructors' answer,** where instructors collectively construct a single answer

Click to start off the wiki answer

**followup discussions** for lingering questions and comments