

Quiz 1, Intro Advanced Math, Sep 6, 2019.

Note: If you get question(s) wrong then:

- Don't worry your grade, you'll get a second chance in the form of HW.
- Do worry about falling behind! Catch up as soon as possible.

1. Let p, q be statements. Which of the following statements are logically equivalent, if any? Which are tautologies, if any?

$$S_1 : p \vee (p \implies q)$$

$$S_2 : p \vee (q \implies p)$$

$$S_3 : p \implies q$$

$$S_4 : (\neg p) \implies (\neg q).$$

2. Suppose $f : \mathbb{R} \rightarrow \mathbb{R}$ is a function. Now consider the following statement:

$$S : \forall b \in \mathbb{R} \exists a \in \mathbb{R} \ f(a) = b$$

Write down the negation $\neg S$.

(To keep things short, use symbols instead of words.)

(To save time, just follow the rules of negating quantifiers without worrying about what S and $\neg S$ actually mean, we'll get back to that soon.)