

Math 1A Sections 308-309

Worksheet 3: September 9, 2009

Since we are short on time this week, we won't get through everything on this worksheet, but please try to finish at home what you don't do in class. Thinking about these questions can be mighty confusing, but once you understand what's going on, you'll be able to solve any question that crops up on the exams.

1. Write the following down in three different ways, (call the numbers x):

• Using Intervals • Using inequalities • Using absolute value

- (a) Numbers whose distance from 3 is less than 5.
- (b) Numbers whose distance from 3 is less than or equal to 5.
- (c) Numbers whose distance from 5 is less than 6.
- (d) Numbers whose distance from a is less than 1.
- (e) Numbers whose distance from a is less than δ .
- (f) Numbers that are within δ units of a .

2. Now write the following sentences using absolute value:

- (a) The distance from x to 3 is less than 5.
- (b) The distance from $f(x)$ to 4 is less than $1/10$.
- (c) The distance from $f(x)$ to L is less than ϵ .

It is REALLY important that you are able to write these inequalities down correctly, so if you're still stuck, come talk to me.

3. Write down the formal definition of $\lim_{x \rightarrow a} f(x) = L$.

4. Prove that $\lim_{x \rightarrow 2} 3x - 4 = 2$.

5. Prove that $\lim_{x \rightarrow 5} 2x + 5 = 15$.

6. (Harder) Can you find those x so that x^2 is within 1 unit of 9?

- (a) Write down the sentence " x^2 is within 1 unit of 9" using absolute value. (Just write it using x^2)
- (b) Once you find the answer, write it in interval notation.
- (c) What is the center of the interval?
- (d) Can you find a smaller interval inside centered around 3?
- (e) Write this interval using absolute value.
- (f) Convince yourself that if x is in this interval, then x^2 is within 1 unit of 9. (This is essentially the whole point of the problem, and you've done all the work by now. The hardest part is just realizing you are done.)