

Math 1501, QUIZ 1

Date: August 29, 2005 Name (printed; last name first) and section: _____

There is one problem on this quiz that is worth eight points. Two points are awarded solely for taking the quiz. Motivate your answers. Partial credit will be awarded.

Decide on intuitive grounds whether or not the indicated limit exists; evaluate the limit if it exists:

$$\lim_{x \rightarrow 5} \frac{x - 5}{10 - 2x}.$$

Solution. We first notice that $10 - 2x = -2(x - 5)$. Then since $x \neq 5$, we have that

$$\frac{x - 5}{10 - 2x} = \frac{x - 5}{-2(x - 5)} = -\frac{1}{2}.$$

Now we can apply the rule that for any constant k , $\lim_{x \rightarrow c} k = k$, and therefore

$$\lim_{x \rightarrow 5} \frac{x - 5}{10 - 2x} = \lim_{x \rightarrow 5} \left(-\frac{1}{2}\right) = -\frac{1}{2}. \quad \square$$

Many students just “plugged in” $x = 5$ and got $0/0$ and thus said that the limit does not exist. Sometimes, that will be the case. However, here we were able to cancel things, and thus the limit does exist. Later on we’ll deal with more sophisticated techniques for determining which expressions of the form $0/0$ actually have a limit, but for now look for cancellation of factors to simplify.

Also, we need to work on our notation. A few of you wrote things like

$$\lim_{x \rightarrow 5} = -\frac{1}{2}.$$

Notice that that expression doesn’t make sense. What are you taking the limit of? Also, writing things such as

$$\text{“} \lim_{x \rightarrow 5^+} = \lim_{x \rightarrow 5^-} \text{,”}$$

so the limit exists” is improper, as you haven’t specified what expression or function you’re taking the limit of.