

# Quiz # 1 Review

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October 15, 2008



*Hello, everyone! Homer Simpson here to give you some help in preparing for your first quiz. As you can see, I was shocked that the time has come up so suddenly! The quiz is next week! For both classes, the quiz will likely take up 20 to 30 minutes at the end of class, and for that day Corey has told me he will answer a few questions at the beginning of class, and then hand out the quiz. Corey has assured me that the point of quizzes is to help you prepare for the exams. So although he'd like to give you the whole class period to take the quiz, it's not a very realistic simulation of what the exam will be like... the quiz will be about half the length of an exam, and the exam will take about 60 minutes (although he'll give you the whole 2 hours), so he figures the best practice for you would be to take no more than half that for the quiz. At any rate, as the class goes on, I and several other fictional creatures will help you out by writing out more specific information to help you prepare for tests and quizzes when the time comes near. Below, for instance, I've sifted through the sections that the quiz will cover, and typed out what I know Corey thinks is important. Keep in mind that the exam will cover this information, as well as some information that we cover between the quiz day and the exam. ROCK ON!*

1. Section 1.1: A preview of Calculus. This section is just to introduce you to the idea that Calculus is something different from everything you've learned so far in

mathematics. It's the study of *change*, rather than the study of equality, although Calculus is certainly interested in equality as well. To be honest, this section is really an introduction to Section 2.1, and Corey will be mentioning that when the time is right. But an understanding of the difference between a *secant line* and a *tangent line* will be very helpful for the quiz, in particular, being able to work through a problem such as number 7 from this section on your own would be of great help to you on the quiz and exam.

2. Section 1.2: Finding limits graphically and numerically. The most important concept from this section is that of a "limit". Being able to find a limit of a function will be on the quiz: whether the function is given to you as a graph, or as a rule (i.e.,  $f(x) = \dots$ ), you should know how to find a limit, or determine if such a limit does not exist. I'm quite certain Corey will also ask you to rigorously prove that a limit exists using the  $\epsilon - \delta$  definition, as in problems 37-48. Although, Corey really isn't a mean guy, so he wouldn't ask you anything unreasonable. If I could stop stuffing my face full of doughnuts I would suggest that you carefully study the homework problems he assigned from this section.
3. Section 1.3: Evaluating limits analytically. In this section we observe that there are several things that always seem to happen when we study limits. For instance,  $\lim_{x \rightarrow 5} x^2 + 4 = 5^2 + 4 = 29$ . The math gods have determined that there are certain situations in which the  $\epsilon - \delta$  argument is not the easiest way to verify that a limit is what you think it is. This section is a summary of these special (but commonly occurring) situations. Corey will likely ask you questions that are similar to those from the homework from this section, although see the next item for general suggestions.
4. Section 1.4: Continuity and one-sided limits. I would know what a continuous function is for sure. This is a big concept, and you will see it later. Remember that there are a few basic functions that we know are continuous, and we have rules that extend the library of continuous functions that we know to many, many functions. Be able to tell which functions are continuous, and why. As far as one sided limits go, I would be able to figure out a one sided limit on a graph that Corey could give you, along with knowing whether or not these exist. The intermediate value theorem is an interesting theorem, and I would know it. It's not clear to me right now exactly if Corey would ask anything about it, but make sure you study the homework questions 83-86 from this section just in case.
5. Section 2.1: The derivative and tangent line problem. You should be able to compute the derivative of any of the basic examples Corey showed you in class, in addition to being able to complete any of the homework problems. You should know how to find the equation of a tangent line as well. More specifically, I can see Corey giving you a function and a point on the graph, and he'd ask "Please find the equation of the

tangent line of the function  $f(x)$  at the point  $(x, f(x))$ . See homework problems 25-32 of this section and 53-56 of the next section (2.2). The next is that differentiability implies continuity. In particular, a more accurate description of what Corey seems to want you to know is to be able to identify where a function could fail to be differentiable. Remember, he could ask those kinds of problems about continuity and limits on graphs. Just remember that anywhere a graph has a sharp point or a vertical tangent line is where it's not differentiable (these aren't the only features that would designate a failure to be differentiable, but just the most likely ones you'd see). It seems like that would be a good final exam question, but that doesn't mean that for this quiz one could be ignorant of these issues. Knowing that a function isn't always differentiable everywhere is an important basic fact.

6. General Suggestions: I suggest that you study for this quiz. That may be a no-brainer, but if you get some good studying in, and you understand the concepts, Corey seems to think that you'll do very well. Also, another no-brainer for you: *read the directions!* Some problems may ask you to do something very straightforward (like questions from section 1.3), while other questions may be more detailed (like the proofs from section 1.2). There's a lot of material to prepare for... the quiz itself will only be about 20 minutes at the beginning of class (before Corey collects the quizzes and lectures some more). So there's no way that Corey could ask about everything on this sheet--this doesn't mean that he wouldn't ask about it on the midterm. Lastly, don't freak out. Whenever I see a question about limits, I usually forget what a limit is, or what I'm supposed to be looking for and say to myself "DO'H!" So, good luck, and remember to take advantage of Corey's office hours in advance if you need help. Oh, and

ROCK ON!