

## Math 2210-4 Exam 0

Please try to answer the questions without consulting your book or your notes. If you absolutely, positively cannot answer a question without looking in the book, feel free to do so. However, make a note to yourself that you need to study that material. This is an exam and should be treated as such. Please work independently. “In your own words” means exactly that. For those questions, I do not want a quote from the book. You might even try analogy for these explanations. You might find that pictures are useful as well. Write in complete sentences.

1. In your own words, define *function*.
2. Give a formal definition for *limit*, then explain what it means.
3. Give a formal definition for *continuous*, then explain what it means.
4. Sketch the graph of a continuous function. Sketch the graph of a function which is not continuous, and explain why it is not continuous.
5. Give a formal definition for the *derivative* of a function.
6. Give a geometric interpretation for the derivative.
7. Explain, in your own words, what a derivative means. Note that this answer should be different from the previous answer.
8. List as many applications for the derivative as you can. First try to list applications within your own major field of study.
9. In your own words, what does it mean for a function  $f$  to be *differentiable* on some interval  $(a, b)$ ?
10. Sketch the graph of a function which is continuous everywhere, but is not differentiable everywhere. Explain why it is not differentiable.
11. Let  $f$  and  $g$  be differentiable functions (meaning differentiable on the entire real line). Define  $h$  by

$$h(t) = f(g(t)) + f(t) \cdot g(t).$$

What is  $h'(t)$ ? What rules did you use?

12. In your own words, explain the following concepts: *absolute maximum*, *absolute minimum*, *relative maximum*, *relative minimum*, and *critical point*
13. In your own words, give a definition for the *definite integral* of a function  $f$  on the interval  $[a, b]$ . Your definition should include the words “limit” and “sum”.
14. What is the difference between a definite integral and an antiderivative (sometimes called an indefinite integral)?
15. State the Fundamental Theorem of Calculus (there are two parts).
16. List as many applications for the definite integral as you can. Again, start within your major.