Math 351: Questions for class discussion, 29th October

Functions of one variable: continuity; limits

Review:

**Cantor ternary set**



Continuity & limits

1. Define *function, domain, graph.*

Let f(x) be defined on (a, b) and let p Define: **f(x) is continuous at x = p.**

Give both the “Mattuck” and the traditional

1. Define: f(x) is **continuous** on (a, b).
2. Prove, using only the definition of continuity, that each of the following functions is continuous on the given interval.
3. f(x) = x2 on (-∞, ∞)
4. f(x) = 1/x on (0, ∞)
5. f(x) =  on (-∞, ∞)
6. f(x) = on (-∞, ∞)
7. Prove that g(x) = sin x is continuous on (-∞, ∞). Hint: show that |sin a – sin b| ≤ |a – b| .
8. What are the four types of discontinuities?
9. Define: right-continuity, left-continuity. Define: **f(x) is continuous on [a, b].**
10. Using (4) prove that Which fact(s) about the Riemann integral are you taking for granted?
11. Let f be defined for x near *p*. Define: **the limit of f(x) as exists and equals L.**
12. (a) Let f(x) = 3x + 1.Prove, using only the definition of limit, that

(b) Let g(x) = Prove, using only the definition of limit, that

(c) Prove that

(d) Prove that

1. [S. Abbott, **Understanding Analysis**, 2nd edition, Springer (2016)]

 True or False? Justify!

1. If a particular has been constructed as a suitable response to a particular challenge, then any smaller positive will also suffice.
2. If and *b* happens to be in the domaing of f, then L = f(b).
3. If
4.

for any function g .

1. What is the relationship between continuity and limit? Define: limit as x.
2. Prove each of the following results, using only the definition of limit.
3.
4.