Math 351: class discussion, 17 September

Limit Theorems



One of the many “find *N* given ” demons

1. Using the error-form principle, prove that if Is the converse true? Proof or counterexample.
2. find an M such that |en| < 0.02 for all n > M.
3. *Review:* Let |a| < 1. For n ≥ 1, let

Using the error-form principle, prove that

*Hint:* Show that

1. State the three main limit theorems for sequences and prove each using the error-form principle.
2. *Using the limit theorems prove that*
3. *( Review of calculus)* Derive a recursive form of Newton’s method for finding roots of a differentiable function y = f(x).
4. Applying Newton’s method to the polynomial p(x) = x2 – 2, find a recursive sequence that converges to Use the error-form principle to prove the result.
5. Prove the **Squeeze theorem**, *viz:*

Given three sequences,

Suppose that

1. *Example:* Let  be given. Then

*Hint:* Use the result of exercise 3.4/5, *viz.*

If c > 0 then

1. *Example:* Prove that

*Hint:*

1. Find *) for different values of a.*
2. Prove the **Sequence location theorem**, *viz:*

 and lim an < M, then an < M for n >> 1.

1. State the corresponding version of the Sequence location theorem for a convergent sequence bounded below.
2. Prove the **Limit location theorem**, *viz:*

 then

1. State the corresponding version of the Limit location theorem for a convergent sequence *bounded below*.
2. Prove the following useful Corollary to the LLT, *viz.*

 Let {an} and {bn} be convergent sequences and assume that an ≤ bn for n >> 1. Then lim an = lim bn.

**Exercises from Apostol**

In Exercises 1 through 10, compute the limits and explain which limit theorems you are using in each case.

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Prime number pattern in the Ulam spiral