Analysis 1B — Epsilon-Delta Example

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# Introduction

Here is an extra example of finding the limit of a function using the definition. This should hopefully give you a guide to the techniques required, and how much detail you should put in your solutions.

# Worked Example

Question:

Let be defined by

Prove that

Solution.

Fix , and suppose that for some to be chosen later. Without loss of generality, suppose that . Then

Now, by the triangle inequality, we have that

Also, by the reverse triangle inequality,

So, if , say we obtain , , and

Hence, if , we find that

Finally, since was arbitrary, we conclude that as required.