Analysis 1B — Epsilon-Delta Example

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Table of Contents

# 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 (this deals with the different definition of at ). Then

Now, by the triangle inequality, we have that

Also, by the reverse triangle inequality,

So, if , we obtain , , and

Hence, if , we find that

Therefore, as was arbitrary, we conclude that