# Comp Phys ps-1

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**Abstract**

This document contains the solutions to the second problem set for computational physics 2023.

## 1 Binary Conversion

The decimal integer 121 converts to 0b1111001 in binary

## 2 Madelung Constant for Sodium Chloride

I calculated an M value of 1.7475645947137108 with L = 300 by using a for loop.
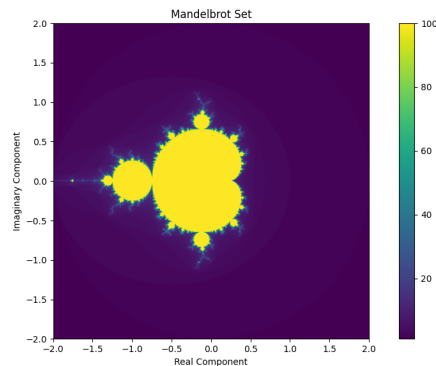It took 9.86 seconds.
Then, I calculated a value of 1.7475645947124154 with L also 300, without using a for loop.
This time it took 1.96 seconds.
It seems numpy is well optimized for these kinds of calculations.

## 3 Mandelbrot Set

My Mandelbrot Set is as follows:

# 4   Mandelbrot Set

The inaccuracy in these result can be explained by Python having trouble operating on floating point numbers that are of very different orders of magnitude.

a) This formula returns [498999.999999 -500999.999999].

b) This time the output is [-1.000000000001e-06, -1.000000000001e-06]

c) The new program uses 64 bit floats to increase the accuracy of the calculation.

# 5   My GitHub

My GitHub username is andredubovski and my repo is here: https://github.com/andredubovski/phys-ua210