

Math 565 - Spring 2019

Homework 6

Due April 10, 2019

Divergent series are the invention of the devil, and it is shameful to base on them any demonstration whatsoever.

— Niels Hendrik Abel, 1928

- (1) Show that $2x + \cos(x) - 2 = O(x)$.
- (2) Compute

$$\sum_{n \leq 15} d(n)$$

compare the result to the estimate we obtained in class (use $\gamma = 0.57721$). How close is the approximation?

- (3) Prove that $d(n)$ is odd if and only if n is a perfect square.
- (4) Prove that $\sigma(n) = O(n^2)$. (Hint: compare $\sigma(n)$ to the sum of all of the integers up to n .)