Assignment 3

Math 351

Contents

1 Instructions

There are two exercises (which were typeset using the theorem environment).

Exercise 1. *Recreate this entire document.*[1]

Exercise 2. *Create a new document containing a short description of three of your favorite books, papers, or other publications. Be sure to include a bibliography, created using BibTeX.*

An assignment which completes Exercise 2 in an interesting way or makes amusing use of mathematical typesetting will earn the coveted LaTeXer of the week distiction.

1.1 When to turn it in

Please upload the `.tex` and `.bib` source files and the `.pdf` output files to your solutions to Assingment 3 on or before Sunday.

2 Euler was excellent

Euler proved many statements, such as

$$\prod_{m=1}^{\infty}(1-q^m)=\sum_{n=\infty}^{\infty}(-1)^n\,q^{\left(3n^2-n\right)/2}. \tag{1}$$

where q is an indeterminate. Equation (1) is known as Euler's pentagonal number theorem. Euler also proved theorem 1 below.

[1] How meta.

Theorem 1 (The Basel Problem.)**.** We have

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$$

.

Euler's original proof of Theorem 1 makes unjustified assumptions that infinite products and sums behave like finite products and sums, but interesting nonetheless and worth displaying.

Proof. Using the power series for sin x, we have

$$\frac{sinx}{x} = \frac{1}{x}\left(x \cdots\right)$$

$\square$