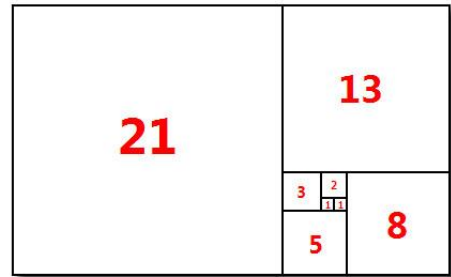# MATH8006: Mathematics for Computing 3

Queueing Theory and Number Theory

MATH8006 is a module covering the basics of queueing theory and number theory.

Queueing theory is concerned with questions one can ask about a given queueing system such as

- What is the average number of customers in the queue?
- How long does a customer spend in the queue on average?
- How likely is it that a customer will have to wait longer than 20 minutes to be served?

While queues are familiar to us from supermarkets, banks and the like, they arise in a great many situations such as data transmission where a `customer' is not a person but a signal or pulse on a communications channel.

Number theory explores properties of the natural numbers. Key concepts include divisibility, greatest common divisors and prime numbers.

- Are there infinitely many prime numbers?
- How can we compute the greatest common divisor of two integers efficiently?
- If you square a whole number can the last digit be 3?

We will answer these questions and more in the course of this module.

There is no final exam for the module. It is examined by two tests: the first around week 6 covering queueing theory (40%), and the second at the end of the semester on number theory (60%).
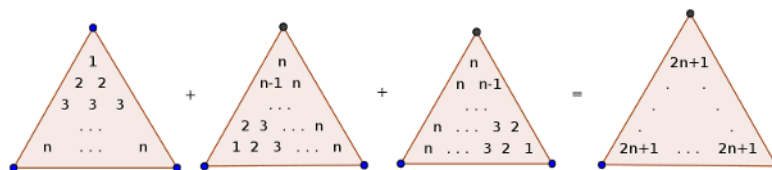
(This picture gives a clue about what the sum $1^2 + 2^2 + 3^2 + \cdots + n^2$ adds up to.)