Lecture 4: Quiz

Problem 1

We have seen Terry Tao in the Colbert show. He mentioned a number theory problem

a) The twin prime problem
b) The perfect number problem
c) The Goldbach problem

Problem 2

One knows that the gaps $p_{n+1} - p_n$ of prime numbers will again and again will have a property that the gap

a) becomes 2  
b) become smaller than 100 Million  
c) becomes smaller than 5  
d) that the gap will be odd

Problem 3

Which movie features the Goldbach conjecture

a) A beautiful mind.  b) Goodwill hunting.  
c) Calculus of love.  d) Enigma

Problem 4

When plotting the number of times an even number $n$ can be written as a sum of two primes we get the

a) Goldbach spiral  b) Sieve of Erastostenes  
c) Goldbach comet  d) Euler spiral

Problem 5
What is a twin cousin?

a) A pair of integers $n, m$ which are both divisible by 1 only.
b) A pair of integers $n, m$ which both are prime.
c) A pair of integers $n, n + 2$ which both are prime.
d) A pair of integers $n, n + 4$ which both are prime.

**Problem 6**

Which theorem assures that $5^{17} - 5$ is divisible by 17?

a) The Riemann hypothesis  b) Fermat’s last theorem  c) Chinese remainder theorem  d) Fermats little

**Problem 7**

Which of the following statements is called **Wilson’s theorem**:

a) $(n! + 1)$ is divisible by $n$.  
   b) $(n + 1)! - 1$ is divisible by $n$.
   c) $(n - 1)! + 1$ is divisible by $n$  
   d) $(n! - 1)$ is divisible by $n$.

**Problem 8**

Two of the following numbers are **perfect numbers**. Which one?

a) 28  b) 6  
   c) 10  d) 12

**Problem 9**

Which of the following theorems characterizes primes. It is a statement which is true if and only if the number is prime

a) Fermat’s little theorem.
   b) The Chinese remainder theorem.
   c) Euclid’s theorem on the infinity of primes.
   c) Wilson’s theorem
   e) The structure theorem of perfect numbers.

**Problem 10**

Who proved first that there are infinitely many primes?

a) Terry Tao  Gauss  b) Euclid  c) Eudoxos  d) Euler