Math 345 – Wednesday 8/30/17

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Office hours: Mondays 12:45–1:45, or by appointment
Course Website: https://zdaugherty.ccnysites.cuny.edu/teaching/m345f17/

Don't forget Homework 0: due Thursday 8/31 by email.
See course website for the rest of the syllabus, as well as instructions for homework 0. Follow these instructions precisely in your email to me to receive credit.

If you want to receive any course-related emails, you must complete Homework 0!

Exercise 5. Primitive Pythagorean triples.

(a) At the end of Chapter 2, the book provides several examples of PPTs. Use a computer to generate 20 *more* examples. (Be sure to enter some of the same values of s and t into your table as given on p. 18, though, to check that your formulas are working properly.) In your homework writeup, report 5 of them in a similar table.

(b) Looking at all the combined data, do you see any more of a pattern of which kinds of numbers a or b can be? (For example, can a be *any* odd number? Or are there restrictions? Can b be *any* even number?) Make hypotheses; prove them if you can.

(c) We showed that in any primitive Pythagorean triple (a, b, c), either a or b is even. Use the same sort of argument to show that either a or b must be a multiple of 3.

(d) Both $(33, 56, 65)$ and $(63, 16, 65)$ are PPTs.
  (i) Compute s and t values for these two PPTs.
  (ii) There are also two PPTs with $c = 85$. What are they?
  (iii) Give another example of a pair of PPTs that have the same c value.
  (iv) Can you find a value of c for which there are *three* primitive Pythagorean triples with the same c? More?
    [Hint: consider the prime factorizations of 65 and 85.]

(e) A nonzero integer d is said to *divide* an integer m if $m = dk$ for some $k \in \mathbb{Z}$. Show that if d divides both m and n, then d also divides $m - n$ and $m + n$.

(f) Do an internet search for "Plimpton 322". What is it? What do we know about it? What is the recent news about our understanding of it (recent as in the last week or so)? Write a brief summary, citing your sources (*don't just rely on Wikipedia*).