MATH 468 Handout #13 April 2, 2014

HW 9: due Friday April 11

1. A **Bonus problem** from Chapter 2:

35 Prove Goldbach's theorem

$$1 = \frac{1}{3} + \frac{1}{7} + \frac{1}{8} + \frac{1}{15} + \frac{1}{24} + \frac{1}{26} + \frac{1}{31} + \frac{1}{35} + \cdots = \sum_{k \in P} \frac{1}{k-1},$$

where P is the set of "perfect powers" defined recursively as follows:

$$P = \{ m^n \mid m \geqslant 2, n \geqslant 2, m \notin P \}.$$

Perfect power corrupts perfectly.

2. A **Bonus problem** from Chapter 6, slightly modified:

80 A sequence defined by the recurrence $A_1 = x$, $A_2 = y$, and $A_n = A_{n-1} + A_{n-2}$ has $A_m = \cancel{1000000}$ 99999 for some m. What positive integers x and y make m as large as possible? Are x and y unique?

3. An **Exam problem** from Chapter 7, with an addition:

45 Evaluate $\sum_{m,n>0} [m \perp n]/m^2n^2$.

Also: Evaluate $\sum_{m,n>0} [m \perp n]/m^4n^4$.