Quantitative Reasoning 28:
The Magic of Numbers

Homework 12

Assigned on Monday October 20th Due at 12 noon Wednesday October 22nd

Please submit problem sets at the end of the relevant lecture, or leave in the box labeled QR28 outside the Math Department's main office, on the third floor of the Science Center (Room 325).

Reading:

Gross-Harris, Chapter 9-10

Problems:

Please explain your reasoning and show your work.

1. Describe all solutions to $122x + 84y = 4$, if we require that x and y be whole numbers.

2. Which of the numbers between 400 and 440 are prime? (Hint: you can test them simultaneously using the Sieve of Eratosthenes. Remember, you only need to run it up to the square root of the biggest number.)

3. Explain why none of the nine consecutive numbers $10! + 2$, $10! + 3$, ..., $10! + 10$ can be a prime number. (Hint: each of the numbers has a small factor.) This is called a "prime desert" of length 9.

4. Can you find a prime desert of length 99?