

Quantitative Reasoning 28: The Magic of Numbers

Homework 12

Assigned on Monday October 22nd
Due at 12 noon Wednesday October 24th

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 how you could measure 2 cups of water given that you have three measuring jugs: one for 12 cups, one for 20 cups, and one for 30 cups.
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 $10! + 2$, $10! + 3$, \dots , $10! + 10$ 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?