A. Suppose I pick a 100-digit number at random. Estimate the probability that it is prime. (Hint: How many 100-digit numbers are there? Keep in mind that the first digit must be nonzero. Use the Prime Number Theorem to estimate the number that are prime.)

Here's another rule of probability, that we haven't discussed. If an event occurs with probability p, then the expected number of independent trials needed, for the event to happen (for the first time), is 1/p. For example, if you're rolling a fair die, and you're trying to roll a 4 or 5, then the probability of success is 1/3, and you expect to roll 1/(1/3) = 3 times to get your first success.

B. How many 100-digit numbers do you expect to try, before you find one that is prime?