Lafayette Problem Group

Tuesday, September 7, 2004

Try as many of these as you can by next week's meeting! Good luck!.

Problem 1: How many integers between 1 and 1000 are multiples of 3 or multiples of 5 but *not* multiples of 45?

Problem 2: Snow started falling at a constant rate before noon. At noon, a snowplow started plowing snow. At 1:00, the plow had traveled 2 miles. At 2:00, the plow had traveled 3 miles. When did the snow begin to fall?

Problem 3: Five students decide to exchange presents. They each put their name into a hat, mix the name cards thoroughly, and draw a card out at random. What is the probability that none of the five draws his or her own name?

Problem 4: Is it possible to list the numbers 1, 2, ..., 15 in such a way that there are neither increasing subsequences of length 5 nor decreasing subsequences of length 5? If so, exhibit such a list. If not, prove that it can't be done.

For example, the listing

1 2 9 *4 6* 10 12 *7* 3 14 8 5 11 15 13

is not such a list, since the italicized numbers form an increasing subsequence of length 5 (and there are many others).

Problem 5: Evaluate

$$\lim_{n\to\infty} \int_0^1 \frac{ny^{n-1}}{1+y} dy \ .$$

Problem 6: If a chicken-and-a-half lays an egg-and-a-half in a day-and-a-half, how many eggs will two chickens lay in one week?

Remember to visit `www.lafayette.edu/ math` often!