That Census Taker Is Back Again

This being the third column of the year, solutions will begin to appear next month. We allow three months between the presentation of a problem and the printing of its solution so that everyone has sufficient time to work on it. Since I must submit my column one month in advance, you have effectively two months. The reason for this long-winded explanation is that several people have asked why their solutions failed to appear when they expected them to. (I should also like to repeat a plea that everyone refer to problems by *number*.)

Problems

Let's begin with the following from Dr. John E. Prussing:

11 A living group calculated its collective grade point average for the all-campus competition. The average grade point was determined to be 3 1/3. The members of the group were also competing for the *Voo Doo* Highest Average Reciprocal Grade Point Award. This grade point is formed by averaging the reciprocals of the individual grade points.

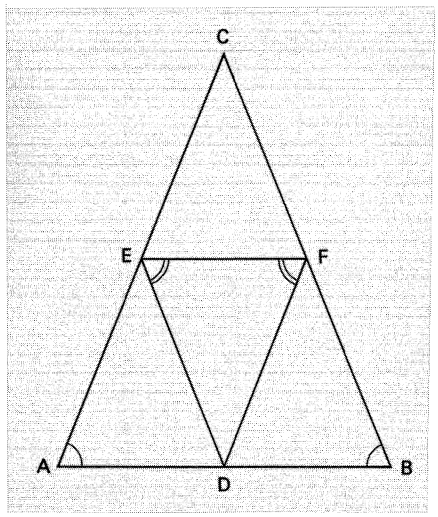
This living group was the last to enter the competition, and the highest average reciprocal grade point prior to their entry was 0.29. The group had to rush to enter before the competition deadline and had time only to calculate their average grade point of 3 1/3. However, the judge looked at this number and declared the group to be the winner of the *Voo Doo* Award. How did he know?

12 Stellar first baseman John P. Rudy, '67, submits the following bridge problem:

	♠ A K 9 4 2 ♥ A 3 ♦ A 6 5 ♣ A 7 3	
♠ 6 3 ♥ Q J 10 9 8 7 6 5 4 ♦ K ♣ 2		♠ 10 ♥ — ♦ Q J 10 9 8 4 ♣ Q J 10 9 6 5
	♠ Q J 8 7 5 ♥ K 2 ♦ 7 3 2 ♣ K 8 4	

Bidding: West: 4♥; North: double; East: pass; South: 4♠. Lead is Q♥. Dummy's ace is put up and ruffed by East. Make any return.

13 Arthur A. Hauser, Jr., has found a new problem similar to number 24 of last year. He wants you to find conditions on the ratio of the altitude to the base of isosceles triangle ABC such that the inscribed triangle DEF with maximum area (D is at the midpoint of AB) has FE parallel to AB.



14 Paul D. Berger, wants you to find a function f defined on the entire real line such that
1. f is bounded and strictly increasing;
2. f is continuous at each point x; and
3. $\lim_{x\to-\infty} f'(x) \neq 0 \neq \lim_{x\to\infty} f'(x)$

15 First recall problem 30 from last year:

"A mathematician moonlighting as a census-taker stops at his friend's house. In this census he is required to obtain the names and ages of all the occupants of the house. After writing down several names and ages the census-taker asks, 'Are there any more people who live here?' His friend replies, 'Yes, there are three more people that live here.' When asked for their ages, the friend reports that the product of the ages is 1296 and the sum is the street number of his house. The census taker makes a few calculations and then says, 'Just tell me one more thing: How many of the three are older than you are?' As soon as his friend replies, the census taker smiles, writes down the ages and leaves. What is the house number?"

Captain John Woolston proposes a variation where two veterans (i.e., older than 18) discuss a similar situation where the house number is not known. One veteran asks how many of them are older. Which reply allows him to determine the house number?

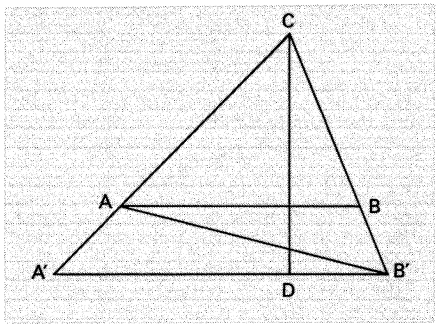
Speed Department

SD5 T. Terwillager wants you to decide to which problem in last April's Puzzle Review this is the answer:
B2C3MR11
C3M11BCR
BC3MR11C
3M11B2CR
B3MR112C
MR11B2C2M
BC2MR11CM
CM11BC2MR
B2C2M11MR
2C11B3MR
B2CR113M
C11BC3MR
BCR11C3M
11B2C3MR

SD6 Prove that if 0 = 1 then Nixon is the Pope. By the way, Bertrand Russell had no trouble with a similar problem.

Better Late Than Never

33 Form ΔABC from the given three altitudes, where AB is the shortest and AC the longest.



Someone finally solved this one. Smith D. Turner submitted the following:

Draw the altitude from C, extending to make DC = AC. Through D draw a line parallel to AB to meet CA and CB extended at A' and B'. CA'B' is the required triangle.

34 Both Mr. Turner and Donald E. Savage noted that Mr. Osgood's proof (Technology Review *for October/November, page 87*) is incorrect. Mr. Savage comments that the solution as published "is a good illustration of an 'extraneous root.' Had he plugged his numbers ($R = 1.22$, $r = .83$) into the second equation, he would have found $7.6 = 2.4 + 10$. While I agree that his quartic follows from the original equations, it has four roots, three of them extraneous to this problem. The correct root is $R = 2.1$, so that $r = 1.9$ (to two places)."

Allan J. Gottlieb is a Teaching Assistant in the Department of Mathematics at Brandeis University (Waltham, Mass. 02154), where mail about Puzzle Corner should be addressed.