Place Value and Modular Arithmetic — Math 1102

1. Let a, b, c, d, and e be digits satisfying $4 \cdot \underline{abcde4} = \underline{4abcde}$. Find all five of the digits.

2. The fido challenge: http://digicc.com/fido/

3. The crystal cabobble challenge: http://www.sinotrading.us/crystalball.htm

4. Think of any positive integer from 1 to 20. Then

   (a) Add 3.

   (b) Multiply by 9.

   (c) Subtract 5.

   (d) Add digits of result.

   (e) Add them again, if more than one digit remains.

   (f) Associate a letter to your number. (A=1, B=2, etc.)

   (g) Think of a state that begins with this letter.

   (h) Think of an animal that begins with the next letter.

   Explain why you came up with an elephant in Delaware!!

5. Don't tell me your age; You might not tell me anyway. But, the Hershey Man will know! YOUR AGE BY Chocolate MATH. This is pretty wild! DON'T CHEAT BY SCROLLING DOWN FIRST! It takes less than a minute so work this out as you read . Be sure you don't read the bottom until you've worked it out! This is not one of those waste of time things, it's fun.

   (a) First of all, pick the number of times a week that you would like to have chocolate (more than once but less than 10)

   (b) Multiply this number by 2 (just to be bold).

   (c) Add 5.

   (d) Multiply it by 50 – I'll wait while you get the calculator.

   (e) If you have already had your birthday this year add 1756 . If you haven't, add 1755.

   (f) Now subtract the four digit year that you were born. You should have a three digit number

   The first digit of this was your original number (i..e., how many times you want to have chocolate each week). The next two numbers are YOUR AGE! THIS IS THE ONLY YEAR (2006) IT WILL EVER WORK, SO SPREAD

IT AROUND WHILE IT LASTS. Of course, your homework for this problem is to figure out why this works.

6. A check is written for x dollars and y cents, both x and y two-digit numbers. In error it is cashed for y dollars and x cents, the incorrect amount exceeding the correct amount by \$17.82. Find a possible value for x and y.

7. Solve the alpha-numeric problem $\underline{2abc} \times 4 = \underline{cba2}$, where a, b and c are decimal digits.

   In the next two problems, we are dealing with six-digit numbers.

8. The rightmost digit of a six-digit number N is moved to the left end. The new number obtained is five times N. What is N?

9. Repeat the same problem with the 'five' changed to a 'four'. That is $4(\underline{abcdef}) = \underline{fabcde}$