Department of Mathematics

March 12, 2010

UNDERGRADUATE MATHEMATICS SEMINAR

The seminar is on hiatus until the spring term. See you then!

Winter 2010 Math Final Exam Schedule

Course #	Course Name	Professor	Room	Day	Date	Time
IMP*112*01	Int Math/Physics 2	Tonnesen-Friedman	NWSE 112	Tue	16-Mar	9:00- 12:00 P.M.
MTH*060*01	Mathematics & Politics	Johnson, B.	SSCI 104	Mon	15-Mar	11:30 - 1:30 P.M.
MTH*060*02	Mathematics & Politics	Johnson, B.	SSCI 104	Mon	15-Mar	11:30 - 1:30 P.M.
MTH*101*01	Calculus with Precalc 2	Noussi, H.	HUMN 115	Mon	15-Mar	11:30 - 1:30 P.M.
MTH*101*02	Calculus with Precalc 2	Noussi, H.	HUMN 115	Mon	15-Mar	11:30 - 1:30 P.M.
MTH*110*01	Calculus 1	Taylor, A.	VART 215	Mon	15-Mar	11:30 - 1:30 P.M.
MTH*110*02	Calculus 1	Taylor, A.	VART 215	Mon	15-Mar	11:30 - 1:30 P.M.
MTH*112*01	Calculus 2	Blue, J.	BAIL 100	Thu	18-Mar	2:30 - 4:30 P.M.
MTH*112*02	Calculus 2	Lesh, K.	OLIN 115	Mon	15-Mar	11:30 - 1:30 P.M.
MTH*112*03	Calculus 2	Plofker, K.	OLIN 115	Mon	15-Mar	11:30 - 1:30 P.M.
MTH*113*01	AP Calculus	Plofker, K.	BAIL 102	Wed	17-Mar	2:30 - 4:30 P.M.
MTH*115*01	Calculus 3	Zwicker, W.	BAIL 207	Thu	18-Mar	8:30 - 10:30 A.M.
MTH*115*02	Calculus 3	Zwicker, W.	BAIL 201	Mon	15-Mar	8:30 - 10:30 A.M.
MTH*117*01	Calculus 4	Blue, J.	BAIL 201	Tue	16-Mar	9:00 - 11:00A.M.
MTH*127*01	Numerical Methods	Hardin, C.	OLIN 306	Thu	18-Mar	8:30 - 10:30 A.M.
MTH*128*01	Probability	Friedman, P.	BAIL 207	Thu	18-Mar	2:30 - 4:30 P.M.
MTH*130*01	Ordinary Differential Equations	Friedman, P.	BAIL 207	Tue	16-Mar	9:00 -11:00 A.M.
MTH*130*02	Ordinary Differential Equations	Wang, J.	BAIL 207	Mon	15-Mar	8:30 - 10:30 A.M.
MTH*197*01	Discrete Math for Comp Sci	Hardin, C.	OLIN 107	Wed	17-Mar	2:30 -4:30 P.M.
MTH*199*01	Intro to Logic & Set Theory	Barbanel, J.	BAIL 207	Wed	17-Mar	2:30 -4:30 P.M.
MTH*224*01	Geometry	Tonnesen-Friedman	BAIL 106	Mon	15-Mar	8:30 - 10:30 A.M.
MTH*340*01	Linear Algebra	Wang, J.	BAIL 104	Tue	16-Mar	9:00 - 11:00 A.M.
MTH*432*01	Abstract Algebra 2	Zimmermann, K.	BAIL 106	Thu	18-Mar	2:30 - 4:30 P.M

Problem of the Newsletter: March 12, 2010

Last week's problem was solved successfully by several people, including **Tomás Kourim**, a visiting student from the Czech Republic, **Nirmala Jayaraman '13**, and **Schuyler Smith.** The problem was: Solve the alphametic below in such a way that maximizes the value of COUNT. (Each of the nine different letters that appear represents exactly one of the digits 0 through 9.)

$$\begin{array}{r} \text{PEOPLE} \\ +\text{COUNT} \\ \hline \text{CENSUS} \end{array}$$

SOLUTION (Census Problem)

We proceed to show that COUNT = 96437 is the maximum value possible, with the overall alphametic solution being

$$\begin{array}{r} 856805 \\ +96437 \\ \hline 953242 \end{array}$$

(That is, P = 8, E = 5, O = 6, L = 0, C = 9, U = 4, N = 3, T = 7, and S = 2.)

Clearly, C = P+1. Since C < 10, we have 1 + E + C = E + 10. Thus, **C = 9** and **P = 8**.

Note that E > 0 and T > 0.

With P = 8 (and since 9 is already taken), we have 8 + U = S + 10 or 8 + U + 1 = S + 10. Thus, U = S + 1 or U = S + 2.

Since we have a carry digit of 1 for both the 10^3 and 10^4 place columns, it follows that O + O + 1 = N + 10. So 2O = N + 9.

In order to maximize COUNT, we make O as large as possible.

Suppose O = 7. Then N = 5. Also, (U,S) $\in$ {(2,0),(1,0),(3,1),(2,1),(4,2),(3,2),(4,3),(6,4)}.
If U = 6 and S = 4, we have 8E78LE + 9765T = 9E5464. But then (looking at the units and tens columns) L = 1 and either E = 1 or T = 1. So no solution is possible in this case.
In a similar fashion of examining the units and tens columns, we rule out all other (U,S) possibilities:

- U = 4 and S = 3 forces L = 9, which is not possible because C = 9.
- U = 3 or 4 and S = 2 leaves a solution for neither E + T = 2 nor E + T = 12.
- U = 2 or 3 and S = 1 leaves a solution for neither E + T = 1 nor E + T = 11.
- U = 1 or 2 and S = 0 forces (E,T) = (4,6) or (6,4), which leaves no solution for L.

We conclude that O cannot be 7.

Suppose **O = 6**. Then **N = 3**. We have 8E68LE + 96U3T = 9E3SUS. To maximize COUNT, we make U as large as possible.
If U = 7, then S = 5. This forces (E,T) = (1,4) or (4,1) and L = 4, so there's no solution in this case.
If U = 5, then S = 4. From the remaining digits, namely 0,1,2,7, there are no solutions for E and T.
If **U = 4**, then **S = 2**. It follows that E + T = 12 and **L = 0**.
To maximize COUNT, we choose **T = 7** and **E = 5**.

Here is this week's problem: Study hard and ace your final exams. No problem, you say? See you in the spring!