## MT00702/SL26601 Ideas in Mathematics: The Grammar of Numbers Quiz: January 30, 1998

Name

You have  $9 + \sqrt{9}$  minutes (in other words, 12 minutes) to do this quiz. You must be explicit in discussing how you arrived at your solutions. Little or no credit will be given for solutions without explanation.

Cheating will be severely punished.

1. (3 points) Using the nikhilam method to multiply two numbers, compute the following product:



2. (3 points) Use the  $y\bar{a}vad\bar{u}nam$  method to compute the square of 94:



3. (3 points) Compute a  $3 \times 3$  magic square using the staircase method:

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4. (6 points) Suppose that a small village in England rings bells 8 times each time a man dies, and 5 times each time a woman dies.

- (a) Which numbers under 30 can occur as men and women die simultaneously?
- (b) Is it true that each number above 30 can occur as possible bell rings?
- (c) As we already did in class, call a number of bell rings *ambiguous* if it can be interpreted in more than one way as indicating the deaths of men and women. The smallest ambiguous number is 40. What are the next two smallest ambiguous numbers?

## Extra Credit (1 point)

You may do only one of the following three questions.

State the *nikhilam* sutra in Sanskrit (English transliteration is fine), along with an English translation.

## or

Diagram and label the nine "cardinal vowel" symbols presented in class.

or

Give a formula for the sum  $1 + 2 + \cdots + n$ .