

Name: _____

Math 378 Spring 2011

Bonus Questions 2

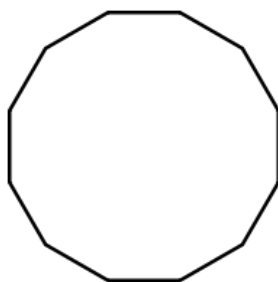
1. According to the Buddha,

Scholars speak in sixteen ways of the state of the soul after death. They say that it has form or is formless; has and has not form or neither has nor has not form; it is finite or infinite; or both or neither; it has one mode of consciousness or several; has limited consciousness or infinite; is happy or miserable; or both or neither.

How many different possible descriptions of the state of the soul after death do you count here?

2. The library of Babel consists of interconnecting hexagonal rooms. Each room contains twenty shelves with thirty-five books of uniform format on each shelf. A book has four hundred and ten pages, with forty lines to a page and eighty characters on a line, taken from an alphabet of twenty-five orthographical symbols (twenty-two letters, comma, period, and space). Assuming that one copy of every possible book is kept in the library, how many rooms are there?

3. Given the twelve vertices of a dodecagon (such as shown below), how many convex pentagons can be formed?



4. How many alphabetical-order, ten-letter configurations of the letters a, \dots, z if each letter may be repeated up to ten times?
5. a) How many rectangles are there in a 7×10 grid? (ie. $1 \times 1, 1 \times 2, \dots, 1 \times 10, 2 \times 1, 2 \times 2, \dots, 7 \times 10$)
(*Hint:* There is one very easy way to count this and many very difficult ways.)
- b) How many rectangles are there in an $m \times n$ grid?

6 (3 points). Suppose there are m points on the positive y-axis and n points on the positive x-axis. If we connect each point on the y-axis to each point on the x-axis, how many intersection points are there if the m and n points on the axes have been chosen carefully enough that every intersection point is on exactly two lines?

(*Hint:* There is one very easy way to count this and many very difficult ways.)