



Benford's Law

Problem #4

Novice / Advanced

4 points

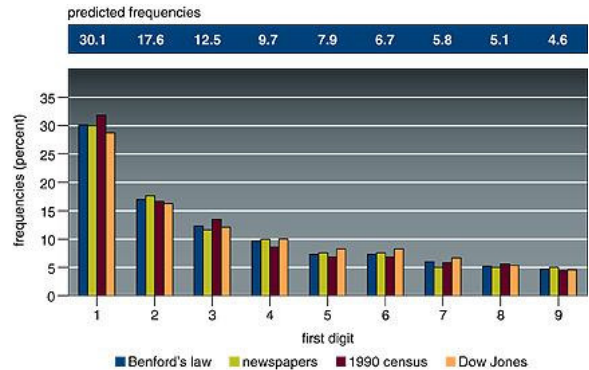
C programmers: your program name must be: prob04.exe
 JAVA programmers: your program name must be: Prob04.class

Task Description

Benford's Law is named after the late Dr. Frank Benford, a physicist. In analyzing various kinds of number sets (everything from baseball statistics to street addresses), Dr. Benford noticed that the probability of the first digit of any number being 1 was around 30%, significantly higher than any other number. Today, Benford's Law is used as a powerful and relatively simple tool for pointing suspicion at frauds, embezzlers, tax evaders and sloppy accountants. This is because these people tend to make up their numbers at random.

Your task is to read a series of numbers from the input file, separated by spaces, and determine the frequencies of the numerals 1 – 9 as the **first digit** of a number (there will be no leading zeroes). You will then print to the screen a summary of the occurrence frequencies of each of the numerals. Frequencies should be rounded down to the nearest whole number.

Frequency can be determined by dividing the number of instances found by the total population sampled.



Program Input

Sample data is contained in Prob04.in. Read this data using one of the methods described on your "Contest Instructions" sheet, under "Program Input/Output". Your program will read a set of integer numbers. There will be one number per line. The set of numbers is terminated by the number 0.

```
14
32934
28723470
2727
.
.
.
2787
118
0
```

Program Output

```
Benford's Law Frequencies
Population includes 726 numbers.
Numeral Sightings Freq.
1 208 28%
2 130 17%
3 87 11%
4 73 10%
5 68 9%
6 44 6%
7 36 4%
8 51 7%
9 29 3%
```