Automatic typewriter

[Award] **10 pts**

[Category] **Probability**

An automatic typewriter can generate a random digit string by generating a sequence of random digits and concatenating them together. Each digit is chosen independently from 0 to 9 with probability 1/55, 2/55, 3/55, 4/55, 5/55, 6/55, 7/55, 8/55, 9/55 and 10/55, respectively. The generation is stopped as soon as a specific pattern occurs in the random string.

*D*(*n*) is a string consisting of first *n* digits of *π*. For example, *D*(3) = 314, *D*(10) = 3141592653.

Let *E*(*n*) be the expected length of the generated random string for the string pattern *D*(*n*). For example, *E*(3) = 4159.375, *E*(10) = 104702034619.87625…. Usually *E*(*n*) is a decimal number.

Let *S*(*n*) be *E*(*n*) rounded to the nearest integer. You are given S(3) = 4159, S(10) = 104702034620 and S(50) = 1812330404172820790558529569081392090013172561045583.

Find S(10000).

As the answer is a very big number, use the following condensed representation:

**(First 10 digits)[(number of remaining digits)](Last 10 digits)**

For instance, the representation of 2127 is: 1701411834[19]5884105728.

Answer format: [condensed representation of *S*(10000)]

Example: 1812330404[32]2561045583 for *S*(50).

[Answer] **6411089098[10823]1105164742**