

Holy Hand Numbers

The below is an excerpt from Armaments, lines 27-68

27. And Saint Abacus did pour over his mathematics, and he did say "O Lord, blesseth thee these
28. mathematics, and with thy blessing, do telleth upon myseld how thy numbers might be in thy
29. blessings, thus that we might feast upon the lambs, the stoats, the sardines, the orangutans, the
30. breakfast cereals..."

-----Some of the original text has been lost-----

41. And the Lord did spake, saying "Frometh this day forwardesth, only shall thy use thy Holy Hand
42. Numbers in thy calculations, and in doing so, blessethed be thy mathematics." And the Lord did
43. continue: "Be thy number of the Holy Hand ifeth and only ifeth thy number meeteth the
44. criterium followth:"

- 45. - 1 thou shalt number without restriction.
- 46. - 2 not shall thy number, lest thee proceed directly to 3.
- 47. - 3 shall be the number at which thou shalt cease thy number.
- 48. - 4 shalt thou not number, lest 3 it does not proceed.
- 49. - 5 is right out.
- 50. - Thou shalt use thy numbers We hath not listeth baring no restrictions.
- 51. - Never shalt a number negative be of the Holy Hand. Thee who useth a negative
- 52. number shall not be in my sight, and shall snuff it.

53. And the Lord did know that it was good, and the peoples did feast upon the lambs, the sloths,
54. the sardines, the orangutans, the breakfast cereals, the coconuts, the finite state automaton,
55. the zebras

-----There is another break in the text-----

66. But despair did Saint Abacus, for whist did he know what was blessethed by He, thy hath
67. suffered in the beingth restrictith in thy numbers thou shalt use in thy mathematics. Henceforth,
68. Saint Abacus did seek to findeth more numbers that he may use in his calculations.

-----End of text-----

Your task is to help Saint Abacus count how many Holy Hand Numbers exist below a given number.

To reiterate, a number is a Holy Hand Number if:

- The number 2 may only appear if the following digit is a 3.
- The final digit must be a 3 (note: The number 3 may appear before the last digit, it simply must also be the last digit).
- 4 may only appear if the immediately previous digit is not a 3.
- 5 may not appear anywhere in the number.
- The number CANNOT be negative.
- 0, 1, 6, 7, 8, and 9 have no restrictions.

As input, you will receive a single integer. Your output should be a single number representing how many Holy Hand Numbers exist between 0 and that number.

For reference, the first 25 Holy Hand Numbers are given below:

3, 13, 23, 33, 43, 63, 73, 83, 93, 103, 113, 123, 133, 143, 163, 173, 183, 193, 233, 303, 313, 323, 333, 363, 373

You should expect numbers up to _____ and reply in time under 2s. //1 second instead?

(I'm thinking something like $2e8$, but would like higher. We'll check execution time on Domjudge and select something fair. I have a fairly smart Java solution).

Sample runs:

Input	Output
450	31
99999	4517
123456789	2889054