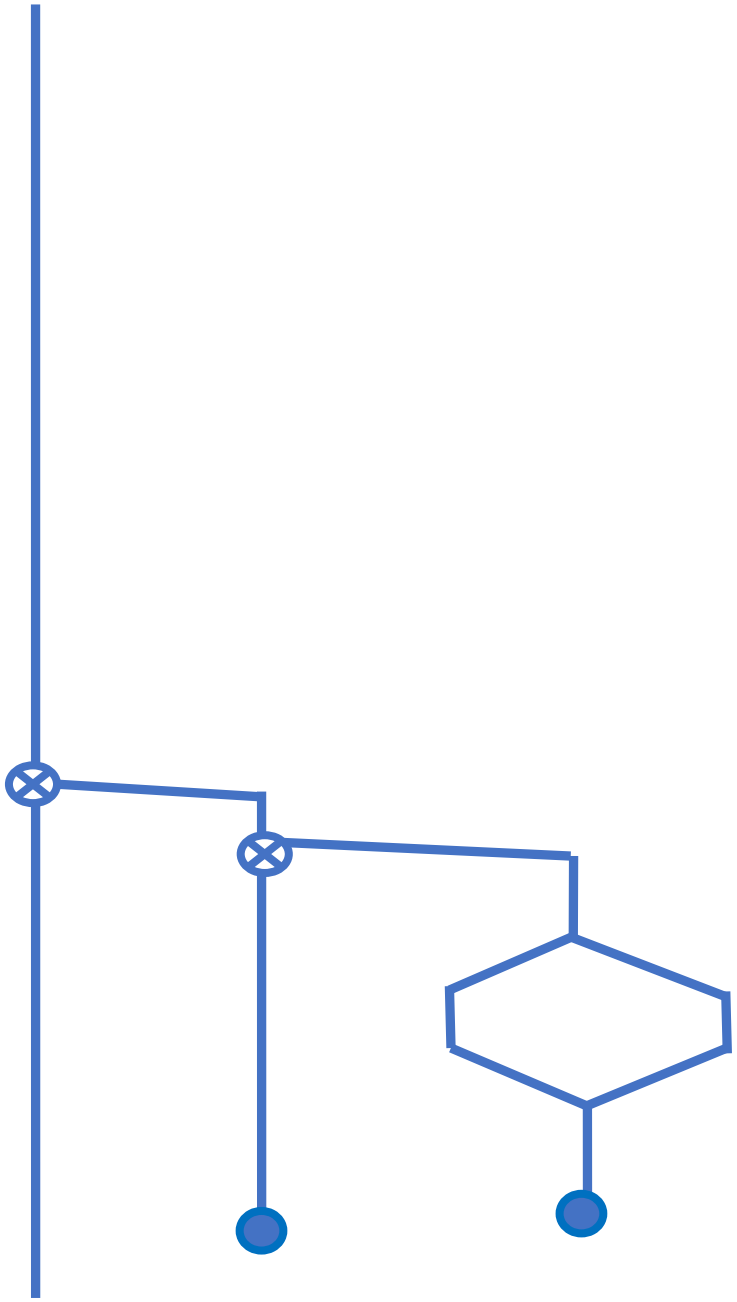

The Road Trip Conjecture

SVFIG

Jan. 25, 2025

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Awareness

During a recent lunch, I saw on the table the formula:

111,111,111 * 111,111,111 =

12,345,678,987,654,321

And decided to investigate it.

The Conjecture

I know 1 squared is 1.

I know 11 squared is 121.

It is likely 111 squared is 12321.

Does that pattern hold for all similar squares up to 12,345,678,987,654,321

I decided to investigate it.

Discoveries

- I wrote the full program thinking it was done.
- Big surprise and learning experience.
- There is no double number multiply in Win32Forth.
- There is a single x single to double. M*
- There is an interesting unsigned double-number formatted print with commas. UD,.R.

Support Words

```
: Msquare  ( n1 — d1 ) \ Square single n1 to double d1.
   dup M*  ;

: increment  ( n1 —- n2 ) \ Shift and append a '1'.
    10 * 1 + ;
```

Driving Program

```
: main ( —— ) \ incrmenting squares
    1                \ initial value
  9 0 do
      dup s>d   cr  14 ud,.r
      dup Msquare   25 ud,.r
      increment loop
      1-  10 / Msquare cr cr 39 d.r ;
```

Results

1	1
11	121
111	12,321
1,111	1,234,321
11,111	123,454,321
111,111	12,345,654,321
1,111,111	1,234,567,654,321
11,111,111	123,456,787,654,321
111,111,111	12,345,678,987,654,321

1234567898765432 1 ok

Q.E.D