Expanding Rational Number in Arbitary p-base

Some examples of expanding rational number in 5-adic basis

5-adic expansions up to 8 digits

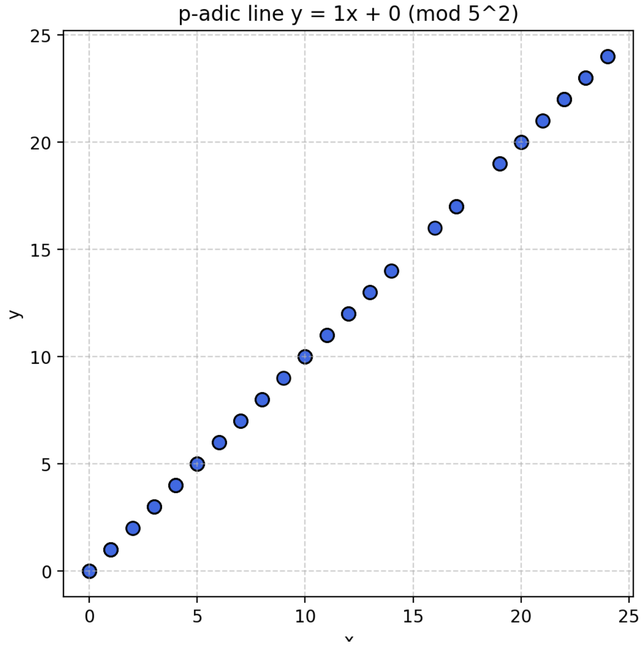
	r	s	x = r/s	11-adic digits (least significant first)
ex1	1	1	1	[1, 0, 0, 0, 0, 0, 0, 0]
ex2	2	1	2	[2, 0, 0, 0, 0, 0, 0, 0]
ex3	3	1	3	[3, 0, 0, 0, 0, 0, 0, 0]
ex4	4	1	4	[4, 0, 0, 0, 0, 0, 0, 0]
ex5	1	2	1/2	[6, 5, 5, 5, 5, 5, 5, 5]
ex6	1	3	1/3	[4, 7, 3, 7, 3, 7, 3, 7]
ex7	2	3	2/3	[8, 3, 7, 3, 7, 3, 7, 3]
ex8	3	2	3/2	[7, 5, 5, 5, 5, 5, 5, 5]
ex9	7	5	7/5	[8, 6, 6, 6, 6, 6, 6, 6]
ex10	8	25	8/25	[10, 0, 3, 5, 7, 9, 0, 3]
ex11	1	25	1/25	[4, 8, 1, 6, 10, 3, 8, 1]
ex12	9	125	9/125	[5, 8, 9, 8, 5, 0, 4, 5]
ex13	-1	1	-1	[10, 10, 10, 10, 10, 10, 10, 10]
ex14	-2	3	-2/3	[3, 7, 3, 7, 3, 7, 3, 7]
ex15	-3	2	-3/2	[4, 5, 5, 5, 5, 5, 5, 5]
ex16	-7	5	-7/5	[3, 4, 4, 4, 4, 4, 4, 4]
ex17	5	1	5	[5, 0, 0, 0, 0, 0, 0, 0]
ex18	25	1	25	[3, 2, 0, 0, 0, 0, 0, 0]
ex19	125	1	125	[4, 0, 1, 0, 0, 0, 0, 0]

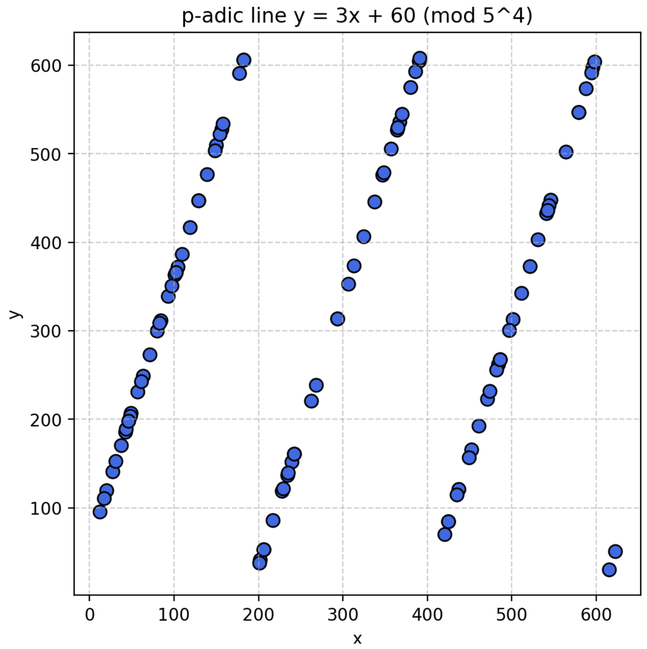
Finding Rational Number corresponding to a p-adic expansion

Some examples of Finding Corresponding Rational Numbers

Description	Base p	Prefix	Cycle	Start power r	Exact rational (Fraction)	≈ Decimal
Finite: $1 + 0\cdot5 + 0\cdot5^2 = 1$	5	[1, 0, 0]	[]	0	1/1	1
Finite: simple 5-adic number	5	[3, 2, 1]	[]	0	38/1	38
Repeating tail '44'	5	[3, 2, 1]	[4, 4]	0	-87/1	-87
Repeating block $(1)(23)_5$	5	[1]	[2, 3]	0	-61/24	-2.54167
Base 7 repeating	7	[2, 3]	[1, 4]	0	-317/48	-6.60417
Pure repeating digit 4	5	[0]	[4]	0	-5/1	-5
Infinite repeating 1 in base 3	3	[0]	[1]	0	-3/2	-1.5
Repeating 3 after prefix 4,2	5	[4, 2]	[3]	0	-19/4	-4.75
Starts at p^{-1} (shifted left one power)	5	[0]	[4]	-1	-1/1	-1
Starts at p^2 (shifted right two powers)	5	[0]	[4]	2	-125/1	-125

I only considered p adic expansion that has a corresponding number in rational number set, namely, a p-adic expansion with a repeating block (cycle) until infinity and some nonrepeating block (prefix) before the repeating block. Also, I considered different starting power of p-adic expansion for example, a p-adic expansion could start from p^2 which has starting power of 2





Plots for Straight line in P-Adic space

The x axis should be x mod p^n

The y axis should be y mod p^n