Non-Euclidean Mathematic

m	n	
$m^2 - n^2$	2mn	$m^2 + n^2$

form a Pythagorean triangle (triple)

A^2	+	B^2	=	C^2

Example m = 2 n = 1

$m^2 - n^2$		2mn		$m^2 + n^2$
$2^2 - 1^2$		2*2*1		$2^2 + 1^2$
$3^{(2)}$	+	$4^{(2)}$	=	$5^{(2)}$

Formula Expansion

				C fix									
					(mA)	–	(nB)	= A´	(mB)	+	(nA)	= B´
$3^{(2)}$	+	$4^{(2)}$	=	5^2	6	–	4	= 2	8	+	3	= 11
$2^{(2)}$	+	$11^{(2)}$	=	5^3	4	–	11	= – 7	22	+	2	=24
$-7^{(2)}$	+	$24^{(2)}$	=	5^4	– 14	–	24	= – 38	48	+	– 7	= 41
$-38^{(2)}$	+	$41^{(2)}$	=	5^5	– 76	–	41	= – 117	82	+	– 38	= 44
$-117^{(2)}$	+	$44^{(2)}$	=	5^6	…infinite…							

Formula Expansion

A fix

					(mB)	+	(nC)	= B´	(mC)	+	(nB)	= C´
3^2	+	$4^{(2)}$	=	$5^{(2)}$	8	+	5	= 13	10	+	4	= 14
3^3	+	$13^{(2)}$	=	$14^{(2)}$	26	+	14	= 40	28	+	13	= 41
3^4	+	$40^{(2)}$	=	$41^{(2)}$	80	+	41	= 121	82	+	40	= 122
3^5	+	$121^{(2)}$	=	$122^{(2)}$	242	+	122	= 364	244	+	121	= 365
3^6	+	$364^{(2)}$	=	$365^{(2)}$	…infinite…							

Formula Expansion

B fix

$m^2 - n^2$		2mn		$m^2 + n^2$
3^2	+	4^2	=	5^2
$2m^3 - n^3$		2mn		$2m^3 + n^3$
15^2	+	4^3	=	17^2
$4m^4 - n^4$		2mn		$4m^4 + n^4$
63^2	+	4^4	=	65^2

general formula $m^z * 2^{(z-2)} - n^z$ 2mn $m^z * 2^{(z-2)} + n^z$

Trivial solutions (elsewhere) C fix

	(mA) – (nB) = A´	(mB) + (nA) = B´
$3^{(2)} + 4^{(2)} = 5^2$	6 – 4 = 2	8 + 3 = 11
$2^{(2)} + 11^{(2)} = 5^3$	4 – 11 = – 7	22 + 2 = 24
	(mA) + (nB) = A´	(mB) – (nA) = B´
$-7^{(2)} + 24^{(2)} = 5^4$	– 14 + 24 = 10	48 – – 7 = 55
	(mA) – (nB) = A´	(mB) + (nA) = B´
$10^{(2)} + 55^{(2)} = 5^5$	20 – 55 = – 35	110 + 10 = 120
$-35^{(2)} + 120^{(2)} = 5^6$	…	

A fix

	(mB) + (nC) = B´	(mC) + (nB) = C´
$3^2 + 4^{(2)} = 5^{(2)}$	8 + 5 = 13	10 + 4 = 14
$3^3 + 13^{(2)} = 14^{(2)}$	26 + 14 = 40	28 + 13 = 41
	(mB) – (nC) = B´	(mC) – (nB) = C´
$3^4 + 40^{(2)} = 41^{(2)}$	80 – 41 = 39	82 – 40 = 42
	(mB) + (nC) = B´	(mC) + (nB) = C´
$3^5 + 39^{(2)} = 42^{(2)}$	78 + 42 = 120	84 + 39 = 123
$3^6 + 120^{(2)} = 123^{(2)}$	…	

note it´s not necessary to change again immediately

Trivial solutions for B fix

because we extend m with 2

m = 1   n = 2

$2m^3 - n^3$ $2mn$ $2m^3 + n^3$

-6^2 + 4^3 = 10^2

We have multiplication, addition and subtraction

so it´s naturally to make also division

with m = 2, n = 1 and C fix we have a simple primality test

Simpliest:

Every prime number x	1 mod 4	divides "the x – 1 step"
Every prime number y	3 mod 4	divides "the y + 1 step"

in B

Simpler:

Every prime number x	1 mod 4	divides "the (x – 1) / 2 step"
Every prime number y	3 mod 4	divides "the (y + 1) / 2 step"

in A or B

Example	x 1 mod 4	= 13	13 – 1 = 12	12 / 2 = 6
	y 3 mod 4	= 11	11 + 1 = 12	12 / 2 = 6

step

2	$3^{(2)}$	+	$4^{(2)}$	=	5^2	
3	$2^{(2)}$	+	$11^{(2)}$	=	5^3	
4	$-7^{(2)}$	+	$24^{(2)}$	=	5^4	
5	$-38^{(2)}$	+	$41^{(2)}$	=	5^5	
6	$-117^{(2)}$	+	$44^{(2)}$	=	5^6	($117 = 3^2,13$ $44 = 2^2, 11$)

...

9	$-718^{(2)}$	+	$-1199^{(2)}$	=	5^9	

...

12	$11753^{(2)}$	+	$-10296^{(2)}$	=	5^{12}	($10296 = 2^3,3^2,11,13$)

also a simple Primality Test with m = 2, n = 1 and A fix

$3^{(x-1)}$ = x divides B if prime

$3^{((x-1)/2)}$ = x divides B or C if prime

Example x = 13 $3^{(13-1)} = 3^{12}$

$3^{12} + 265720^2 = 265721^2$ ($2^3,5,7,13,73$)

$3^{((13-1)/2)} = 3^6$

$3^6 + 364^{(2)} = 365^{(2)}$ ($2^2,7,13$) (5,73)

and a simple Primality Test for

$2^{(x-1)}$ -1 = x divides if prime

$2^{((x-1)/2)}$ $+-1$ = x divides if prime

Example x = 13 $2^{(13-1)} = 2^{12} - 1 = 4095$ ($3^2,5,7,13$)

$2^{((13-1)/2)} = 2^6 +- 1 =$ 65 (5,13) 63 (3^2,7)

With *Some Number Examples* we see that we can give all possible $^{\text{even even odd}}$

A fix m = 4 n = 1 we get $A^3 + B^4 = C^2$

$15^2 + 8^{(2)} = 17^{(2)}$ $32 + 17 = 49$ $68 + 8 = 76$

$15^3 + 49^{(2)} = 76^{(2)}$ …

$(15^3 + 7^4 = 76^2)$

A fix m = 12 n = 1 we get $A^3 + B^2 = C^4$

$143^2 + 24^{(2)} = 145^{(2)}$ $288 + 145 = 433$ $1740 + 24 = 1764$

$143^3 + 433^{(2)} = 1764^{(2)}$ …

$(143^3 + 433^2 = 42^4)$

A fix m = 2 n = 1 …we get… $A^5 + B^4 = C^2$

$3^5 + 121^{(2)} = 122^{(2)}$

$(3^5 + 11^4 = 122^2)$

C fix m = 3 n = 2 we get $A^4 + B^2 = C^3$

$5^{(2)} + 12^{(2)} = 13^2$ $15 - 24 = -9$ $36 + 10 = 46$

$-9^{(2)} + 46^{(2)} = 13^3$ …

$(-3^4 + 46^2 = 13^3)$

C fix m = 122 n = 27 we get $A^2 + B^8 = C^3$

$14155^{(2)} + 6588^{(2)} = 15613^2$ 1726910 – 177876 = 1549034 803736 + 382185 = 1185921

$1549034^{(2)} + 1185921^{(2)} = 15613^3$ …

($1549034^2 + 33^8 = 15613^3$)

With B m = 1 n = 3 $2m^3 - n^3$, $2mn$, $2m^3 + n^3$ we get $A^4 + B^3 = C^2$

$-25^2 + 6^3 = 29^2$

($-5^4 + 6^3 = 29^2$)

With B m = 203 n = 237 $2m^3 - n^3$, $2mn$, $2m^3 + n^3$ we get $A^8 + B^3 = C^2$

$3418801^2 + 96222^3 = 30042907^2$

($43^8 + 96222^3 = 30042907^2$)

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