**A useful criterion to identify candidate twin primes**

Prashanth R. Rao

**Abstract:** In a previous paper we derived that if p, p+2 are twin-primes then $2^{p-2}$ is of the form (pz+y) where z, y must have unique solutions. We extend this result to derive a single criterion that we believe is novel that may be useful to screen for candidate twin primes.

**Results:**

If p, p+2 are large twin primes then as shown in a previous paper

$2^{p-2}=pz+y$ (where z and y are unique solutions for any pair of twin primes)

Multiplying by 4,

$2^{p}=4pz+4y$

Subtracting 2 from both sides,

$2^{p}-2= 4pz+4y-2$

Since p is prime, therefore it follows from Fermat's little theorem that $2^{p}-2$ is divisible by p therefore

$4y-2=p*u$ (where u is an even integer, since p is a large prime and therefore odd)

Therefore $y=(p*u+2)/4$ …….(I)

Since p+2 is also prime, therefore it follows Fermat's little theorem, $2^{p+2}-2$ is divisible by p+2.

$2^{p+2}-2 = (p+2)b$ where b=6y, (as shown in previous paper)

we can rewrite $b=6y= (2^{p+2}-2)/(p+2)$

Therefore $y=\{(2^{p+2}-2)\}/\{6(p+2)\}$

Or $y=\{(2^{p+1}-1)\}/\{3(p+2)\}$………….(II)

From (I) and (II) it follows that

$(p*u+2)/4=\{(2^{p+1}-1)\}/\{3(p+2)\}$

$(p*u+2)=\{(4)(2^{p+1}-1)\}/\{3(p+2)\}$
Therefore

$p*u=\{(4)(2^{p+1}-1)\}/\{3(p+2)\}-2$

$p*u=\{(2^{p+3}-4)-(2)(3)(p+2)\}/ \{3(p+2)\}$

$p*u=\{2(2^{p+2}-2-3p-6)\}/ \{3(p+2)\}$

$p*u=\{2(2^{p+2}-3p-8)\}/ \{3(p+2)\}$

$u=\{2(2^{p+2}-3p-8)\}/ \{3p(p+2)\}$

Therefore if p, p+2 represent large twin-primes then the expression $(2^{p+2}-3p-8)$ is perfectly divisible by thrice the product of the twin primes. This single criterion may be directly applied to screen for large candidate twin primes.

**References:**

1. An elementary approach to explore possible constraints on the infinite nature of twin primes
[816] viXra:1410.0112 (Number Theory)