About The Number of Twin Prime

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Abstract

The proof that there are infinite twin primes.

1 Introduction

Are there infinite number of twin prime[1]?

2 Understanding

Assuming that prime number p_a, p_b, p_c, p_d, p_e, p_f:

$$p_a = (n^3 + 3n^2 + 2n)p_b + p_c$$
$$p_d = (m^3 + 3m^2 + 2m)p_e + p_f$$

And also:

$$p_d = p_a + 2$$

The twin prime conjecture is that the number of $(p_a,\ p_d)$ is infinite. It would be true if the number of solution $p_d - p_a = 2$ is infinite. And assuming that:

$$\begin{aligned} p_d - p_a &= (m^3 + 3m^2 + 2m)p_e + p_f - (n^3 + 3n^2 + 2n)p_b - p_c \\ &= (m^3 + 3m^2 + 2m)p_e - (n^3 + 3n^2 + 2n)p_b + p_f - p_c = 2 \end{aligned}$$

By upper equation with an assumption of primality and expanding cases, the condition goes:

$$\begin{aligned} &(m^3 + 3m^2 + 2m)p_e - p_c = 1, p_f - (m^3 + 3m^2 + 2m)p_b = 1, n(^\forall(p_b, p_c, p_e, p_f)) = \infty \\ &\Rightarrow n(^\exists\{(p_a, p_d) \mid p_d = p_a + 2\}) = \infty \end{aligned}$$

And:

$$\begin{aligned} &(m^3 + 3m^2 + 2m)p_e - p_c = (m^3 + 3m^2 + 2m)p_e - (m'^3 + 3m'^2 + 2m')p'_c - p''_c = (\cdots) - k \quad (0 \le k < 6) \\ &p_f - (m^3 + 3m^2 + 2m)p_b = -(m^3 + 3m^2 + 2m)p_b + (m'^3 + 3m'^2 + 2m')p'_f + p''_f \\ &= (\cdots) + r \quad (0 \le r < 6) \end{aligned}$$

When $k = 5$ and $r = 1$, it fills the upper condition.

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3 Conclusion

There are infinite twin primes.

References

[1] D. Goldston, S. Graham, J. Pintz, and C. Yıldırım, “Small gaps between primes or almost primes,” *Transactions of the American Mathematical Society*, vol. 361, no. 10, pp. 5285–5330, 2009.