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On the difference of primes

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In the present work we investigate the largest possible gaps between consecutive numbers which can be written as the difference of two primes. The best known upper bounds are the same as those concerning the largest possible difference of Goldbach numbers (that is, numbers which can be written as the sum of two primes). Thus, we know that any interval of the form [X, X+X^c] contains numbers which are the difference (or sum, respectively) of two primes, where c=21/800. It is announced in our work that there is a constant C such that for sufficiently large X all intervals of the form [X, X+(logX)^C] contain an even integer which can be written as the difference of two primes. The work contains, as an illustration of the method, the proof of the weaker result that given an arbitrarily small c>0, the interval [X, X+X^c] contains the difference of two primes if X is large enough. Some conditional results are announced too, which are valid under the deep unproved hypothesis that primes have an admissible level of distribution larger than 1/2. The above hypothesis implies, for example, the existence of a large constant C (depending on the admissible distribution level of the primes) such that for sufficiently large values of X the interval [X, X+C] contains at least one even number which can be written as the difference of two consecutive primes in infinitely many ways.

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