



Estimathon[®]

David Patrick
Art of Problem Solving

October 8, 2016

No electronic devices are permitted. You can ask me for clarification of anything that you think is ambiguous. (I may choose not to provide any clarification.)

Estimate each of the following with an interval of the form $[n, 5n]$ for some n :

1. The number of positive multiples of 11 with no repeated digits.
2. The number of Boeing 777's ever built*.
3. The size, in acres, of the Qualcomm Stadium parking lot.
4. The number of Twitter followers that Barack Obama had at 1:32 PM on 10/7/2016.
5. Total deposits, in U.S. dollars, held by Bank of America at the end of 2015[†].
6. The quantity $\sqrt[100]{2} - 1$ (that is, the positive 100th root of 2, minus 1).
7. The total number of points played in the first round of the Men's Singles tennis tournament at the 2016 U.S. Open.
8. The fifth-smallest perfect number. (A **perfect number** is a positive integer that is equal to the sum of its proper divisors, meaning its positive integer divisors other than the number itself. The smallest perfect number is $6 = 1 + 2 + 3$.)
9. The number of hotel rooms in San Diego County at the end of 2015[‡].
10. $\text{lcm}(A, B, C)$, where A , B , and C are integers between 1 and 100 inclusive that Dave chose at random yesterday afternoon.

Acknowledgement: The rules of the game, and many of the problems, are due to Andy Neidermaier of Jane Street Capital. "Estimathon" is a registered trademark of Jane Street Capital.

*through July 2016, according to Wikipedia

†according to their annual report

‡according to the San Diego Tourism Authority



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Answers

1. The number of positive multiples of 11 with no repeated digits.
2. The number of Boeing 777's ever built[§].
3. The size, in acres, of the Qualcomm Stadium parking lot.
4. The number of Twitter followers that Barack Obama had at 1:32 PM on 10/7/2016. or
5. Total deposits, in U.S. dollars, held by Bank of America at the end of 2015[¶]. or
6. The quantity $\sqrt[100]{2} - 1$ (that is, the positive 100th root of 2, minus 1). or
7. The total number of points played in the first round of the Men's Singles tennis tournament at the 2016 U.S. Open.
8. The fifth-smallest perfect number. (A **perfect number** is a positive integer that is equal to the sum of its proper divisors, meaning its positive integer divisors other than the number itself. The smallest perfect number is $6 = 1 + 2 + 3$.) or – this is $2^{12}(2^{13} - 1)$
9. The number of hotel rooms in San Diego County at the end of 2015^{||}.
10. $\text{lcm}(A, B, C)$, where A , B , and C are integers between 1 and 100 inclusive that Dave chose at random yesterday afternoon. – the chosen numbers were 12, 99, and 18.

[§]through July 2016, according to Wikipedia

[¶]according to their annual report

^{||}according to the San Diego Tourism Authority



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Team Name: _____ Checks: 1 2 3 4

Problem	Answer Interval	Correct?
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		