

Supplement to A New Lower Bound for Odd Perfect Numbers

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Notation:

N is an odd perfect number (if one exists) and p a prime.
 $p^k \rightarrow s$ means that $s = \sigma(p^k)$ or $\sigma(p^k)/2$ and $p^k \parallel N$ implies $s \mid N$.
 B_1 is integer part of \log_{10} (lower bound on N if $p^k \parallel N$), using LCM and factors of $\sigma(p^k)$ shown.
 B_2 is integer part of $\log_{10}(p^{2k})$, so 10^{B_2} is a lower bound on N if $p^k \mid N$.
 B_3 is integer part of \log_{10} (lower bound on N valid at this point in the proof tree).
 D means $\sigma(p^k)$ has a divisor which has already been considered.
 S means $\sigma(N) > 2N$; worst-case relevant factors of N follow.
 n means a number (prime or composite) used in bound only via LCM.
 $p\#$ means a prime of $\#$ decimal digits, equal to 1 mod 4, defined by division or the same as on the previous line.
 $P\#$ means a prime of $\#$ decimal digits, equal to 3 mod 4, defined by division or the same as on the previous line.
 q^m means prime at beginning of line to power m .
 \dots means a number which is irrelevant to the proof.
 Factors given explicitly are prime.

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1: 127^2 => 3.5419, B1 12
2: 5419^2 => 3.31.313.1009, B1 23
3: 1009^1 => 5.101, B1 29
4: 101^2 => 10303, B1 37
5: 10303^2 => 3.5827.6073, B1 53
6: 6073^2 => 3.7..., S 3^4.5^2.7^2
7: 6073^4 => 61.1909811.11677891, B1 90
8: 11677891^2 => 3.31.73.97..., S 3^4.5^2.31^2.61^2.73^2.97^2.101^2
9: 11677891^4 => 5.11..., S 3^4.5^2.11^2
10: 11677891^6 => 7..., S 3^4.5^2.7^2
11: 11677891^10 => 23..., S 3^4.5^2.23^2.31^2
12: 11677891^12, B2 169
13: 6073^6 => 239.2591.P17, B1 113
14: 81026278242304207^2 => 3.5281.P30, B1 180
15: 81026278242304207^4 => 281.n, B1 217; q^6, B2 202
17: 6073^10 => 11..., S 3^4.5^2.11^2
18: 6073^12 => 280099.1910331582415162583.p22, B1 181
19: 6073^16 => n, B1 166
20: 6073^18 => n, B1 181; q^22, B2 166
22: 10303^4 => 30241.p12, B1 77
23: 372649725281^2 => 457.631964743.p12, B1 123
24: 480831112093^2 => 3.13812131371.p13, B1 170
25: 480831112093^4 => 31.n, B1 192; q^6, B3 170
27: 372649725281^4 => 5.11..., S 3^2.5^2.11^2.31^2
28: 372649725281^6 => 7..., S 3^2.5^2.7^2
29: 372649725281^10, B2 231
30: 10303^6 => 127.2087122493.P13, B1 97
31: 4513076485163^2 => 19^2.1033.7581127.P13, B1 145
32: 7204504086883^2 => 3..., S 3^4.5^2.19^2.31^2
33: 7204504086883^4, B3 170
34: 4513076485163^4 => 11..., S 3^2.5^2.11^2.31^2
35: 4513076485163^6 => 7..., S 3^2.5^2.7^2
36: 4513076485163^10, B2 253
37: 10303^10 => 1738389269.p31, B1 149
38: p31^2 => 3.271.n, B1 214; q^4, B2 247
40: 10303^12 => p49, B1 173
41: 10303^16 => 17..., S 3^2.5^2.17^2.31^2.101^2.127^2
42: 10303^18 => 191.761.n, B1 178; q^22, B2 176
44: 101^4 => 5.31.491.1381, B1 44
45: 1381^2 => 3.7..., S 3^4.5^2.7^2
46: 1381^4 => 5.811.1091.822761, B1 76
47: 822761^2 => 7..., S 3^2.5^4.7^2
48: 822761^4 => 5.11..., S 3^2.5^4.11^2.31^2
49: 822761^6 => 87332057.231473537.P20, B1 170
50: 822761^10 => 89.n, B1 184
51: 822761^12 => 53.911.n, B1 210; q^16, B2 189
53: 1381^6 => 71.2087.P14, B1 94

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- 54: 469851... 2 -> 3.13... S 3'4.5'2.13'2
- 55: 469851... 6 -> 3.13... S 3'2.5'4.11'2.31'2
- 56: 469851... 6 -> 3.13... S 3'2.5'4.11'2.31'2
- 57: 1381'10 -> 41.131.12671.83827171.P25, BI 132
- 58: 8205693... 6 -> 73.n, BI 168; q'4, B3 166
- 59: 1381'12 -> 41.131.12671.83827171.P25, BI 132
- 60: 1381'12 -> 41.131.12671.83827171.P25, BI 132
- 61: 1381'12 -> 41.131.12671.83827171.P25, BI 132
- 62: 1381'12 -> 41.131.12671.83827171.P25, BI 132
- 63: 1381'16 -> 41.131.12671.83827171.P25, BI 132
- 64: 1381'18 -> 41.131.12671.83827171.P25, BI 132
- 65: 1381'22 -> 41.131.12671.83827171.P25, BI 132
- 66: 10156 -> 41.131.12671.83827171.P25, BI 132
- 67: 1510049791'2 -> P21, BI 101
- 68: 228025037556421836807'2 -> 3.13... S 3'4.5'2.13'2
- 69: 228025037556421836807'4, B2 162
- 70: 1510049791'7 -> 41.131.12671.83827171.P25, BI 162
- 71: 1510049791'6 -> 41.131.12671.83827171.P25, BI 162
- 72: 1510049791'6 -> 41.131.12671.83827171.P25, BI 162
- 73: 1510049791'6 -> 41.131.12671.83827171.P25, BI 162
- 74: 101210 -> 23.1876403.P13, BI 85
- 75: 2585122674619'2 -> 3.7... S 3'4.5'2.7'2
- 76: 2585122674619'4 -> 3.7... S 3'2.5'2.23'2.31'2.71'2.101'10.127'2.313'2
- 77: 185122674619'6 -> 197.n, BI 211; q'10, B2 248
- 78: 289103427728'2 -> 21.0934531.P16, BI 147
- 79: 8522287169499847'2 -> 3.7... S 3'4.5'2.7'2
- 80: 8522287169499847'4, B3 178
- 81: 289103427728'4 -> 11.31... S 3'2.5'2.11'2.31'2
- 82: 1089103427728'6 -> 21.n, BI 224; q'10, B2 249
- 83: 123381258044279742571'2 -> n, BI 165; q'4, B2 176
- 84: 10118 -> 7069.180898282637837.P17, BI 133
- 85: 9447429862267623'2 -> 37.n, BI 168; q'4, B3 167
- 86: 10122 -> 47.P43, BI 157
- 87: 10128 -> 10824711302231307209.P38, BI 193
- 88: 10130 -> 26041.184087231748933.7045802627904971.P25, BI 205
- 89: 10136 -> n, BI 169; q'40, B2 160
- 90: 918 -> 47.P43, BI 157
- 91: 47.P43 -> 47.P43, BI 157
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811: 673*4 => 421.2531.192811, BI 72
812: 192811*2 => 3.20323.60957, BI 94
813: 60957*2 => 3.397.523.596899, BI 116
814: 10357*2 => 3.7231.7549.10357, BI 137
815: 10357*2 => 3.7231.7549.10357, BI 137
816: 10357*4 => n, BI 161
817: 10357*4 => n, BI 161
818: 10357*6 => n, BI 177; q*10, B3 169
819: 596899*4 => 201451858141.p12, BI 174
820: 596899*6 => 43.n, BI 177; q*10, B3 162
821: 60957*2 => 3.397.523.596899, BI 116
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823: 60957*2 => 3.397.523.596899, BI 116
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826: 60957*6 => 43.n, BI 177; q*4, B3 180
827: 60957*10 => 43.n, BI 186
828: 60957*12 => 43.n, BI 224; q*16, B2 185
829: 192811*6 => 10.15713.463567.112.1910
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831: 29924193375*4 => n, BI 188; q*4, B3 188
832: 29924193375*4 => n, BI 188; q*4, B3 188
833: 192811*10 => 2.7.1189, BI 168; q*16, B2 169
834: 6732811*12 => n, BI 189
835: 14985447209 => 4.1905447, BI 89
836: 14985447209 => 4.1905447, BI 89
837: 1690099754311*2 => 3.1127.20731.p17, BI 170
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839: 1690099754311*6, BI 171
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841: 14985447*4 => 191.22091.38351.1350760001.p13, BI 171
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844: 673*10 => 23.891.20021.p20, BI 172; q*10, B2 163
845: 4183205287966413311*2 => 7.31.n, BI 165; q*4, B3 163
846: 673*12 => 1251524428753.p22, BI 140; BI 184; q*4, B3 184
847: 690855180220756335677*2 => 3.n, BI 184; q*4, B3 184
848: 673*16 => 243101.675071.p35, BI 174
849: 673*22 => p31, BI 163
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856: 177481*2 => 3.227, BI 64
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863: 62060021*4 => 3.227, BI 64
864: 116856*4 => 1.1113... S 3*2.5*2.11*2.13*2
865: 116856*4 => 1.1113... S 3*2.5*2.11*2.13*2
866: 5754*6 => 1.1113... S 3*2.5*2.11*2.13*2
867: 5754*6 => 1.1113... S 3*2.5*2.11*2.13*2
868: 116856*4 => 1.1113... S 3*2.5*2.11*2.13*2
869: 116856*4 => 1.1113... S 3*2.5*2.11*2.13*2
870: 116856*4 => 1.1113... S 3*2.5*2.11*2.13*2
871: 62060021*4 => 3.227, BI 64
872: 62060021*4 => 3.227, BI 64
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874: 62060021*4 => 3.227, BI 64
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876: 62060021*4 => 3.227, BI 64
877: 1912 => 5.117, S 3*2.5*2.7*2
878: 13338869*2 => 3.16950847, BI 70
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882: 316950847*4 => 1.1951.1182431.2395275511.p12, BI 155
883: 316950847*4 => 1.1951.1182431.2395275511.p12, BI 155
884: 2807704869*4 => n, BI 104
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892: 13338869*6 => 4.144, BI 171; q*10, B2 162
893: 13338869*6 => 4.144, BI 171; q*10, B2 162
894: 18*16 => 3044803, BI 61
895: 99995282631947*4 => 6.87403.1311127.10050613.129574807, BI 110
896: 12554803576 => 4.144, BI 171; q*10, B2 162
897: 12554803576 => 4.144, BI 171; q*10, B2 162
898: 12554803576 => 4.144, BI 171; q*10, B2 162
899: 12554803576 => 4.144, BI 171; q*10, B2 162
900: 12554803576 => 4.144, BI 171; q*10, B2 162
901: 12554803576 => 4.144, BI 171; q*10, B2 162
902: 12554803576 => 4.144, BI 171; q*10, B2 162
903: 12554803576 => 4.144, BI 171; q*10, B2 162
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906: 1034216414703938*2 => 3.907.n, BI 190; q*6, B2 194
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