

A Catalogue of Equilateral Limit Curves that Are Circles

Compiled by Peter J. C. Moses, May 2026

Some equilateral limit curves (ELCs) are circles. In fact, any point that is on the circumcircle will remain on the circumcircle as the triangle tends to the equilateral. However, some points that are not on the circumcircle for all triangles may have the circumcircle as ELC. In all cases, the circle has barycentric equation

$$(1 - r^2) * (x + y + z)^2 - 3 * (yz + zx + xy) = 0$$

where r is the radius.

```
Radius = Sqrt[97 - 56*Sqrt[3]]
{7601, 8306, 8338, 10817, 11833, 19386}
```

```
Radius = 1/8
{6667, 6721, 6722, 6723, 9826, 10276, 11566, 11746, 11748, 12052, 12900, 13416, 14717, 14726,
 14745, 14760, 15088, 15092, 15119, 15366, 15368, 15473, 15902, 15903, 15904, 17724, 18240}
```

```
Radius = Sqrt[7 - 4*Sqrt[3]]/2
{8302, 8334, 8980, 8988, 8994, 8997, 8998, 13908, 13913, 13915, 13916, 13918, 13922, 13923,
 19382}
```

```
Radius = 1/7
{15036, 19632}
```

```
Radius = 2*Sqrt[97 - 56*Sqrt[3]]
{8308, 8340, 19388, 19482, 19484, 19507}
```

```
Radius = 2/13
{15042}
```

```
Radius = 3/19
{15023}
```

```
Radius = 1/6
{9167, 10281, 10956, 14971, 16222, 16224}
```

Radius = $3/16$
{15465}

Radius = $1/5$
{3315, 10352, 11596, 12227, 12228, 12748, 12774, 13198, 13267, 14060, 14061, 15051, 15059, 15472, 17719}

Radius = $2/9$
{15046}

Radius = $\text{Sqrt}[13 - 4*\text{Sqrt}[3]]/11$
{19002}

Radius = $\text{Sqrt}[3]/(6 + \text{Sqrt}[3])$
{19056, 19058, 19078, 19109, 19111, 19113, 19115}

Radius = $(1 + 2*\text{Sqrt}[3])^{-1}$
{19052, 19060, 19076, 19082, 19094}

Radius = $3/13$
{15029}

Radius = $1/4$
{620, 974, 1112, 1387, 1830, 1862, 2023, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3722, 4422, 4986, 5083, 5185, 5186, 5461, 5972, 5977, 5985, 5988, 6036, 6107, 6128, 6670, 6698, 6699, 6702, 6710, 6711, 6712, 6713, 6714, 6715, 6716, 6717, 6718, 6719, 6720, 7687, 8068, 8560, 9478, 9507, 9978, 10034, 10035, 10111, 10120, 10271, 10277, 10816, 10821, 11028, 11642, 11723, 11724, 11725, 11726, 11727, 11728, 11729, 11730, 11731, 11732, 11733, 11734, 11735, 12014, 12016, 12080, 12099, 12131, 12132, 12133, 12137, 12138, 12140, 12141, 12145, 12236, 12358, 12735, 12736, 12814, 13006, 13166, 13372, 13526, 13552, 13553, 14708, 14738, 14740, 14750, 14752, 14757, 14759, 14764, 14766, 14769, 14771, 14772, 14774, 14778, 14780, 15113, 15118, 15240, 15252, 15367, 15452, 15528, 15558, 15645, 16108, 16109, 16174, 16359, 16578, 16598, 16599, 16701, 16734, 16760, 17009, 17044, 17199, 17439, 17467, 17468, 17882, 17883, 18254, 18645, 18689, 18700, 18723, 19378, 19481, 19662}

Radius = $\text{Sqrt}[7 - 4*\text{Sqrt}[3]]$
{7598, 8316, 8348, 10819, 11835, 13640, 13641, 13642, 13643, 13645, 13649, 13652, 13653, 13654, 13655, 13661, 19398}

Radius = $3/11$
{15025}

Radius = $2/7$
{10353}

Radius = $1/3$
{5149, 5182, 5470, 5622, 6034, 9166, 10053, 10054, 10057, 10058, 10061, 10065, 10086, 10087, 10088, 12184, 12189, 12350, 12356, 12373, 12381, 12739, 12749, 12763, 12775, 12903, 12905, 12941, 12945, 13104, 13116, 13118, 13182, 13189, 13217, 13273, 13278, 13296, 13311, 13313, 13479, 13544, 13548, 14151, 14639, 14643, 14644, 14701, 14850, 15035, 15055, 15061, 15142, 15462, 15463, 15483, 15560, 15561, 16173, 16223, 16225, 16529}

Radius = $\text{Sqrt}[(2 - \text{Sqrt}[3])/2]$
{6231, 6303, 8293, 9892, 10812, 13520, 13670, 13676, 13703, 13873, 13874, 13875}

Radius = $3/8$
{16270}

Radius = $2/5$
{4473, 9696, 15017, 15040, 15081, 19348, 19456, 19457, 19504, 19631}

Radius = $\text{Sqrt}[13 + 4*\text{Sqrt}[3])/11$
{19001}

Radius = $\text{Sqrt}[3]/(6 - \text{Sqrt}[3])$
{19055, 19057, 19077, 19108, 19110, 19112, 19114}

Radius = $(-1 + 2*\text{Sqrt}[3])^{-1}$
{19051, 19059, 19075, 19081, 19093}

Radius = $3/7$
{15020, 15044, 15057}

Radius = $1/2$
{11, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 203, 214, 215, 244, 245, 246, 247, 338, 339, 619, 678, 1015, 1017, 1084, 1086, 1095, 1099, 1109, 1111, 1145, 1146, 1227, 1281, 1283, 1312, 1313, 1314, 1315, 1317, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1511, 1525, 1537, 1539, 1560, 1561, 1562, 1565, 1566, 1569, 1845, 1846, 1977, 1986, 2008, 2026, 2027, 2028, 2029, 2039, 2040, 2170, 2310, 2446, 2447, 2454, 2455, 2482, 2486, 2611, 2615, 2628, 2632, 2634, 2638, 2643, 2645, 2677, 2678, 2679, 2680, 2681, 2682, 2686, 2903, 2914, 2967, 2968, 2969, 2970, 2971, 2972, 2973, 2974, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3043, 3044, 3045, 3046, 3047, 3048, 3119, 3120,

3121, 3122, 3123, 3124, 3125, 3163, 3166, 3171, 3184, 3201, 3248, 3258, 3259, 3269, 3270, 3271, 3318, 3319, 3320, 3321, 3322, 3323, 3324, 3325, 3326, 3327, 3328, 3708, 3756, 3802, 3937, 3942, 4014, 4027, 4081, 4092, 4094, 4117, 4128, 4152, 4154, 4366, 4368, 4370, 4403, 4432, 4437, 4459, 4465, 4466, 4475, 4516, 4534, 4542, 4712, 4736, 4738, 4760, 4783, 4858, 4904, 4934, 4939, 4953, 4957, 4965, 4996, 5026, 5095, 5099, 5139, 5151, 5181, 5190, 5460, 5477, 5479, 5494, 5497, 5509, 5510, 5511, 5512, 5513, 5514, 5515, 5516, 5517, 5518, 5519, 5520, 5521, 5522, 5577, 5578, 5579, 5580, 5581, 5582, 5612, 5642, 5950, 5952, 5976, 5982, 5993, 5997, 6018, 6019, 6020, 6021, 6022, 6023, 6024, 6025, 6026, 6027, 6028, 6029, 6055, 6062, 6068, 6092, 6109, 6111, 6126, 6148, 6174, 6184, 6246, 6377, 6388, 6506, 6592, 6593, 6594, 6627, 6651, 6732, 6739, 6741, 6754, 6774, 6783, 6784, 6786, 6791, 6793, 6797, 7004, 7062, 7063, 7065, 7067, 7068, 7117, 7158, 7159, 7200, 7202, 7207, 7208, 7215, 7266, 7332, 7333, 7334, 7358, 7664, 7668, 7711, 7723, 8054, 8286, 8287, 8288, 8290, 8298, 8299, 8300, 8735, 8754, 8783, 8786, 8787, 8843, 8846, 8847, 8848, 8850, 8901, 8902, 8932, 9117, 9151, 9152, 9155, 9172, 9193, 9261, 9283, 9298, 9408, 9419, 9427, 9430, 9471, 9475, 9502, 9880, 10017, 10036, 10113, 10114, 10214, 10227, 10272, 10291, 10294, 10354, 10427, 10487, 10491, 10494, 10501, 10504, 10505, 10506, 10552, 10555, 10612, 10689, 10690, 10933, 11128, 11130, 11274, 11275, 11557, 11560, 11561, 11569, 11570, 11587, 11597, 11598, 11626, 11656, 11672, 11693, 11694, 11700, 11701, 11702, 11706, 11709, 11710, 11711, 11712, 11713, 11714, 11715, 11716, 11717, 11718, 11719, 11720, 11721, 11722, 11792, 11796, 11797, 11800, 11801, 11804, 11805, 11806, 11807, 11918, 11936, 11988, 11998, 12018, 12026, 12035, 12036, 12037, 12041, 12042, 12091, 12093, 12094, 12176, 12191, 12192, 12198, 12199, 12201, 12204, 12207, 12258, 12261, 12265, 12292, 12295, 12354, 12494, 12611, 12619, 12624, 12665, 12743, 12746, 12758, 12770, 12809, 12824, 12825, 12826, 12827, 12828, 12829, 12830, 12831, 12832, 12835, 12896, 13075, 13141, 13193, 13194, 13195, 13202, 13234, 13249, 13265, 13358, 13379, 13392, 13466, 13497, 13499, 13517, 13539, 13540, 13609, 13611, 13612, 13613, 13626, 13627, 13756, 13870, 13871, 13994, 13999, 14027, 14049, 14071, 14082, 14101, 14103, 14107, 14108, 14109, 14137, 14219, 14369, 14439, 14650, 14652, 14660, 14664, 14672, 14674, 14675, 14678, 14688, 14689, 14690, 14704, 14706, 14714, 14847, 14856, 14857, 14920, 14921, 14935, 14936, 14972, 14990, 15089, 15093, 15094, 15116, 15117, 15140, 15166, 15167, 15169, 15241, 15303, 15304, 15357, 15359, 15449, 15450, 15507, 15525, 15526, 15527, 15530, 15595, 15607, 15608, 15609, 15610, 15611, 15612, 15613, 15614, 15615, 15616, 15626, 15647, 15730, 15746, 15753, 15814, 15816, 15863, 15871, 15906, 16111, 16163, 16164, 16165, 16177, 16178, 16184, 16185, 16188, 16221, 16240, 16271, 16278, 16280, 16282, 16360, 16573, 16586, 16591, 16592, 16593, 16594, 16595, 16596, 16597, 16613, 16614, 16719, 16723, 16725, 16726, 16727, 16728, 16729, 16730, 16731, 16732, 16733, 16742, 16758, 16759, 16803, 16811, 16812, 16938, 16978, 16979, 17058, 17059, 17060, 17071, 17191, 17195, 17197, 17198, 17205, 17213, 17214, 17216, 17219, 17413, 17416, 17417, 17419, 17421, 17423, 17426, 17429, 17433, 17455, 17460, 17462, 17463, 17464, 17465, 17466, 17475, 17476, 17477, 17509, 17607, 17621, 17755, 17761, 17793, 17853, 17854, 17855, 17856, 17875, 17876, 17877, 17878, 17879, 17880, 17881, 17886, 17888, 18035, 18037, 18038, 18101, 18103, 18113, 18181, 18184, 18187, 18188, 18191, 18205, 18210, 18211, 18270, 18273, 18274, 18277, 18334, 18402, 18413, 18577, 18800, 18801, 18802, 18803, 18807, 18809, 18968, 18969, 18975, 18976, 19157, 19160, 19163, 19268, 19295, 19380, 19400, 19557, 19561, 19563, 19571, 19572, 19574, 19575, 19576, 19578, 19579, 19580, 19581, 19585, 19590, 19592, 19593, 19907, 19922, 19939}

Radius = $2\sqrt{7 - 4\sqrt{3}}$
{8304, 8336, 19384}

Radius = $4/7$
{18932, 18933, 18947}

Radius = $1/\sqrt{3}$
{1662, 1663, 1666, 1667, 11771, 11780}

Radius = $3/5$
{14679, 15021, 15027, 15034, 15745}

Radius = $\sqrt{229 - 132\sqrt{3}}$
{12186, 12352, 12377, 12741, 12765, 12894, 12988, 12996, 13184, 13215, 13275, 13298}

Radius = $5/8$
{15151}

Radius = $2/3$
{5150, 5469, 5621, 12213, 14651, 15015, 15041, 15563}

Radius = $\sqrt{2*(2 - \sqrt{3})}$
{12375, 12891, 13287}

Radius = $3/4$
{11623, 12019, 13148, 15114, 15115, 15251, 15738, 16105, 16534}

Radius = $6/(6 + \sqrt{3})$
{19392}

Radius = $(2\sqrt{3})/(1 + 2\sqrt{3})$
{8310, 8342}

Radius = $4/5$
{12165, 12168, 13171}

Radius = $7/(5\sqrt{3})$
{11779, 11788}

Radius = $6/7$
{15039}

Radius = $5/(4 + \text{Sqrt}[3])$
{19394}

Radius = $(5*\text{Sqrt}[3])/(3 + 4*\text{Sqrt}[3])$
{8312, 8344}

Radius = $5/(3*\text{Sqrt}[3])$
{11774, 11783}

Radius = 1
{14, 67, 74, 80, 88, 94, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 162, 163, 190, 248, 265, 287, 290, 291, 292, 293, 294, 295, 296, 301, 328, 334, 335, 336, 337, 476, 477, 643, 644, 645, 646, 648, 651, 653, 655, 658, 660, 662, 664, 666, 668, 670, 671, 673, 675, 677, 681, 685, 687, 689, 691, 692, 694, 697, 699, 701, 703, 705, 707, 709, 711, 713, 715, 717, 719, 721, 723, 725, 727, 729, 731, 733, 735, 737, 739, 741, 743, 745, 747, 753, 755, 759, 761, 767, 769, 771, 773, 777, 779, 781, 783, 785, 787, 789, 791, 793, 795, 797, 799, 803, 805, 807, 809, 811, 813, 815, 817, 819, 823, 825, 827, 831, 833, 835, 839, 840, 841, 842, 843, 886, 889, 892, 895, 897, 898, 901, 903, 906, 907, 909, 911, 913, 915, 917, 919, 923, 925, 927, 929, 930, 931, 932, 933, 934, 935, 953, 972, 1018, 1020, 1113, 1114, 1120, 1121, 1141, 1156, 1177, 1205, 1263, 1280, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1320, 1331, 1332, 1338, 1379, 1380, 1381, 1382, 1411, 1414, 1415, 1416, 1417, 1438, 1461, 1462, 1477, 1484, 1492, 1494, 1576, 1581, 1606, 1623, 1624, 1625, 1632, 1633, 1634, 1783, 1793, 1795, 1797, 1807, 1808, 1809, 1810, 1811, 1813, 1814, 1815, 1821, 1897, 1910, 1911, 1916, 1922, 1927, 1929, 1934, 1937, 1942, 1945, 1949, 1952, 1956, 1967, 1972, 1976, 1978, 1987, 1989, 2006, 2010, 2054, 2102, 2103, 2104, 2105, 2107, 2119, 2154, 2157, 2159, 2161, 2166, 2195, 2196, 2222, 2224, 2249, 2250, 2291, 2311, 2316, 2338, 2341, 2342, 2349, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2479, 2480, 2481, 2576, 2577, 2580, 2581, 2586, 2587, 2597, 2603, 2613, 2617, 2626, 2648, 2652, 2656, 2660, 2665, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2700, 2701, 2702, 2703, 2704, 2705, 2706, 2707, 2708, 2709, 2710, 2711, 2712, 2713, 2714, 2715, 2716, 2717, 2718, 2719, 2720, 2721, 2722, 2723, 2724, 2725, 2726, 2727, 2728, 2729, 2730, 2731, 2732, 2733, 2734, 2735, 2736, 2737, 2738, 2739, 2740, 2741, 2742, 2743, 2744, 2745, 2746, 2747, 2748, 2749, 2750, 2751, 2752, 2753, 2754, 2755, 2756, 2757, 2758, 2759, 2760, 2761, 2762, 2763, 2764, 2765, 2766, 2767, 2768, 2769, 2770, 2855, 2856, 2857, 2858, 2859, 2860, 2861, 2862, 2863, 2864, 2865, 2866, 2867, 2868, 2966, 2986, 2987, 2988, 2989, 2990, 2991, 2993, 3065, 3067, 3222, 3225, 3226, 3227, 3228, 3254, 3257, 3376, 3401, 3404, 3439, 3455, 3458, 3466, 3479, 3512, 3563, 3565, 3659, 3699, 3732, 3799, 3807, 3862, 3864, 3882, 3888, 3903, 3908, 3909, 3939, 3952, 4013, 4033, 4069, 4080, 4103, 4115, 4427, 4436, 4482, 4499, 4505, 4510, 4518, 4551, 4552, 4553, 4554, 4555, 4556, 4557, 4558, 4559, 4561, 4562, 4563, 4565, 4566, 4568, 4569, 4571, 4572, 4573, 4574, 4575, 4576, 4577, 4578, 4579, 4582, 4583, 4584, 4586, 4587, 4588, 4589, 4591, 4592, 4593, 4594, 4595, 4596, 4597, 4598, 4599, 4602, 4603, 4604, 4605, 4606, 4607, 4609, 4610, 4611, 4612, 4613, 4614, 4615, 4616, 4617, 4621, 4622, 4623, 4624, 4625, 4626, 4627, 4628, 4629, 4630, 4631, 4632, 4633, 4634, 4635, 4636, 4637, 4639, 4674, 4752, 4756, 4767, 4781, 4792, 4845, 4876, 4945, 4947, 4997, 5380, 5386, 5389, 5464, 5474, 5503, 5504, 5505, 5508, 5545, 5546, 5547, 5548, 5549, 5606, 5610, 5613, 5618, 5619, 5620, 5641, 5648, 5655, 5660, 5896, 5897, 5900, 5916, 5917, 5951, 5961, 5966, 5970, 5978, 5983, 5992, 5994, 5995, 6010, 6011, 6012, 6013, 6014, 6015, 6016, 6017, 6033, 6037, 6039, 6040, 6054, 6078, 6079, 6080, 6081, 6082, 6083, 6091, 6093, 6094, 6095, 6096, 6099, 6105, 6135, 6136, 6151, 6158, 6169, 6183, 6187, 6188, 6189, 6190, 6233, 6234, 6236, 6265, 6295, 6321, 6323, 6325, 6330, 6331, 6335, 6336, 6343, 6344, 6345, 6380, 6386, 6394, 6516,

6517, 6528, 6529, 6531, 6540, 6543, 6551, 6558, 6559, 6568, 6569, 6570, 6571, 6572, 6573, 6574, 6575, 6576, 6577, 6578, 6579, 6584, 6595, 6596, 6599, 6606, 6613, 6614, 6635, 6648, 6649, 6650, 6653, 6733, 6740, 6742, 6758, 6775, 6778, 6780, 6799, 6801, 6802, 7043, 7052, 7060, 7061, 7077, 7095, 7126, 7150, 7166, 7167, 7168, 7233, 7239, 7245, 7256, 7257, 7258, 7259, 7260, 7261, 7281, 7287, 7312, 7313, 7316, 7326, 7343, 7351, 7597, 7722, 7727, 7728, 7953, 7954, 7970, 7972, 7974, 7978, 7983, 7984, 8050, 8052, 8059, 8064, 8097, 8098, 8103, 8104, 8115, 8116, 8268, 8269, 8289, 8292, 8295, 8297, 8439, 8460, 8471, 8481, 8587, 8592, 8593, 8594, 8600, 8652, 8671, 8683, 8684, 8685, 8686, 8687, 8690, 8691, 8693, 8694, 8695, 8696, 8697, 8698, 8699, 8700, 8701, 8706, 8707, 8708, 8709, 8724, 8738, 8749, 8750, 8751, 8752, 8753, 8759, 8764, 8767, 8773, 8777, 8781, 8789, 8791, 8827, 8836, 8842, 8851, 8852, 8858, 8921, 8926, 8927, 8937, 9056, 9057, 9058, 9059, 9060, 9061, 9062, 9063, 9064, 9065, 9066, 9067, 9068, 9069, 9070, 9071, 9072, 9073, 9074, 9075, 9076, 9077, 9078, 9079, 9080, 9081, 9082, 9083, 9084, 9085, 9086, 9087, 9088, 9089, 9090, 9091, 9092, 9093, 9094, 9095, 9096, 9097, 9098, 9099, 9100, 9101, 9102, 9103, 9104, 9105, 9106, 9107, 9108, 9109, 9110, 9111, 9113, 9116, 9124, 9132, 9133, 9136, 9140, 9142, 9145, 9146, 9150, 9160, 9161, 9184, 9186, 9187, 9190, 9192, 9196, 9198, 9202, 9203, 9206, 9211, 9215, 9216, 9227, 9278, 9302, 9365, 9372, 9381, 9432, 9442, 9456, 9468, 9483, 9487, 9497, 9750, 9759, 9760, 9769, 9772, 9773, 9775, 9831, 9864, 9869, 9877, 9881, 9884, 9886, 9888, 9934, 9966, 9970, 9976, 10031, 10069, 10070, 10073, 10074, 10077, 10081, 10089, 10090, 10091, 10098, 10100, 10101, 10102, 10118, 10121, 10152, 10153, 10215, 10229, 10260, 10264, 10265, 10290, 10293, 10330, 10409, 10410, 10420, 10423, 10425, 10496, 10497, 10498, 10511, 10512, 10554, 10557, 10657, 10663, 10681, 10692, 10693, 10695, 10696, 10697, 10698, 10699, 10700, 10701, 10702, 10703, 10704, 10705, 10706, 10707, 10708, 10709, 10710, 10711, 10712, 10713, 10714, 10715, 10716, 10717, 10718, 10719, 10720, 10721, 10722, 10723, 10724, 10725, 10726, 10727, 10728, 10729, 10730, 10731, 10732, 10733, 10734, 10735, 10736, 10737, 10738, 10739, 10740, 10741, 10742, 10743, 10744, 10745, 10746, 10747, 10748, 10749, 10750, 10751, 10752, 10753, 10754, 10755, 10756, 10757, 10758, 10759, 10760, 10761, 10762, 10763, 10764, 10765, 10766, 10809, 10810, 10836, 10854, 11060, 11069, 11072, 11077, 11084, 11086, 11087, 11088, 11092, 11117, 11118, 11122, 11138, 11141, 11150, 11152, 11154, 11161, 11162, 11219, 11256, 11419, 11559, 11562, 11564, 11568, 11571, 11579, 11593, 11599, 11600, 11602, 11603, 11604, 11605, 11606, 11608, 11609, 11610, 11611, 11612, 11613, 11632, 11635, 11636, 11643, 11646, 11651, 11652, 11653, 11654, 11658, 11670, 11689, 11696, 11698, 11699, 11703, 11744, 11794, 11814, 12011, 12029, 12030, 12031, 12032, 12033, 12034, 12074, 12092, 12117, 12119, 12121, 12149, 12154, 12157, 12177, 12182, 12185, 12219, 12348, 12351, 12368, 12371, 12374, 12419, 12434, 12507, 12515, 12531, 12532, 12584, 12593, 12596, 12641, 12730, 12733, 12737, 12740, 12751, 12755, 12759, 12761, 12764, 12771, 12772, 12778, 12780, 12784, 12868, 12888, 12889, 12893, 12898, 12901, 12904, 12918, 12921, 12925, 12951, 12955, 13099, 13117, 13136, 13138, 13143, 13149, 13153, 13167, 13169, 13170, 13178, 13180, 13183, 13191, 13211, 13213, 13225, 13233, 13238, 13241, 13247, 13248, 13260, 13271, 13274, 13280, 13289, 13293, 13294, 13297, 13312, 13324, 13395, 13396, 13397, 13398, 13402, 13417, 13444, 13486, 13493, 13494, 13496, 13518, 13529, 13530, 13532, 13535, 13536, 13537, 13538, 13542, 13546, 13554, 13556, 13559, 13560, 13576, 13578, 13582, 13593, 13594, 13597, 13605, 13859, 13863, 13997, 14072, 14074, 14081, 14083, 14084, 14144, 14172, 14175, 14177, 14180, 14182, 14183, 14185, 14188, 14193, 14200, 14204, 14217, 14367, 14372, 14388, 14498, 14543, 14544, 14545, 14546, 14554, 14559, 14560, 14570, 14574, 14578, 14579, 14586, 14594, 14598, 14600, 14601, 14604, 14605, 14612, 14616, 14625, 14649, 14653, 14655, 14658, 14659, 14662, 14665, 14666, 14677, 14680, 14681, 14682, 14702, 14718, 14719, 14720, 14722, 14723, 14727, 14728, 14733, 14734, 14776, 14781, 14830, 14833, 14834, 14849, 14854, 14871, 14901, 14905, 14908, 14910, 14919, 14941, 14942, 14943, 14944, 14945, 14946, 14970, 14979, 14980, 14982, 14983, 14985, 14987, 14989, 15065, 15128, 15131, 15164, 15165, 15168, 15181, 15182, 15227, 15268, 15269, 15289, 15291, 15322, 15323, 15324, 15337, 15342, 15343, 15344, 15352, 15364, 15365, 15439, 15440, 15455, 15459, 15478, 15499, 15501, 15521, 15522, 15535, 15545, 15546, 15550, 15553, 15567, 15596, 15627, 15628, 15629, 15641, 15664, 15728, 15731, 15735, 15736, 15743, 15744, 15907, 15930, 15958, 16039, 16077, 16080, 16081, 16082, 16093, 16098, 16099, 16100, 16101, 16102, 16166, 16167, 16169, 16170, 16219, 16243, 16256, 16362, 16365, 16508, 16510, 16641, 16643, 16648, 16650, 16680, 16771, 16806, 16807, 16813, 17101, 17136, 17222, 17223, 17402, 17406, 17636, 17638, 17652, 17654, 17660, 17661, 17664, 17667, 17708, 17906, 17914, 17929, 17930, 17931, 17932, 17938, 17939, 17940, 17946, 17947, 17949, 17954, 17956, 17957, 17961, 17962, 17963, 17965, 17970, 17971, 17972, 17973,

17974, 17980, 17981, 17982, 17983, 18019, 18023, 18024, 18025, 18026, 18030, 18031, 18032, 18036, 18047, 18062, 18063, 18125, 18265, 18268, 18284, 18300, 18315, 18316, 18317, 18319, 18359, 18366, 18372, 18384, 18401, 18441, 18478, 18479, 18576, 18740, 18765, 18785, 18787, 18793, 18815, 18816, 18817, 18818, 18821, 18822, 18823, 18824, 18825, 18826, 18827, 18828, 18829, 18830, 18831, 18858, 18864, 18876, 18877, 18878, 18883, 18889, 18893, 18895, 18896, 18897, 18903, 19120, 19138, 19140, 19301, 19302, 19374, 19379, 19381, 19402, 19469, 19470, 19479, 19505, 19506, 19609, 19621, 19626, 19628, 19629, 19634, 19635, 19636, 19637, 19638, 19644, 19657, 19775, 19905, 19911, 19914}

Radius = $7/(4\sqrt{3})$
{11776, 11785}

Radius = $(3\sqrt{3})/5$
{11775, 11784}

Radius = $2/\sqrt{3}$
{11772, 11781}

Radius = $7/(4 + \sqrt{3})$
{19396}

Radius = $7/\sqrt{19 + 8\sqrt{3}}$
{8314, 8346}

Radius = $5/4$
{6053, 9945, 9946, 13226, 15253}

Radius = $4/3$
{15050}

Radius = $\sqrt{(2 + \sqrt{3})}/2$
{6230, 6307, 8294, 9894, 10813, 13521, 13790, 13796, 13823, 13926, 13927, 13928}

Radius = $7/5$
{19639}

Radius = $6/(6 - \sqrt{3})$
{19393}

Radius = $(2\sqrt{3})/(-1 + 2\sqrt{3})$
{8311, 8343}

Radius = $\sqrt{2}$
{12179, 12180, 12345, 12346, 12365, 12366, 12460, 12461, 12462, 12463, 12466, 12467, 12470, 12471, 12478, 12479, 13176, 13177, 13208, 13209, 13228, 13229, 13230, 13231}

Radius = $2\sqrt{2(2 - \sqrt{3})}$
{13029, 19390}

Radius = $3/2$
{5609, 5700, 10609, 10990, 10991, 10992, 10993, 13393, 13996, 14448, 14671, 14900, 14928, 14981, 15063, 15300, 15564, 15725, 16002, 16003}

Radius = $5/3$
{15565}

Radius = $\sqrt{3}$
{11778, 11787}

Radius = $7/4$
{9951, 9952, 13227}

Radius = $\sqrt{7 + 4\sqrt{3}}/2$
{8303, 8335, 12744, 12768, 13262, 13967, 13968, 13969, 13976, 13977, 13979, 13981, 13985, 13989, 13990, 13991, 13992, 19383}

Radius = 2
{146, 147, 148, 149, 150, 151, 152, 153, 399, 617, 1054, 1272, 1282, 1421, 1718, 1768, 1787, 1979, 2079, 2100, 2101, 2108, 2110, 2112, 2114, 2116, 2146, 2448, 2449, 2606, 2619, 2629, 2636, 2640, 2892, 2926, 2930, 2931, 2932, 2935, 2936, 2946, 2948, 2950, 3196, 3448, 3464, 3506, 3511, 4440, 4919, 5400, 5528, 5539, 5540, 5541, 5623, 5667, 5668, 5673, 5678, 5683, 5684, 5685, 5898, 5989, 6069, 6127, 6224, 6264, 6299, 6326, 6773, 6777, 7170, 7600, 7665, 7669, 7731, 8008, 8009, 8157, 8173, 8178, 8301, 8428, 8434, 8438, 8450, 8485, 8591, 8782, 8849, 8856, 8857, 8922, 8925, 8935, 8936, 9114, 9143, 9259, 9263, 9317, 9324, 9355, 9359, 9405, 9412, 9413, 9431, 9451, 9457, 9480, 9509, 9512, 9860, 9862, 9875, 9878, 9890, 9897, 9900, 9904, 9981, 9984, 9998, 9999, 10016, 10117, 10355, 10488, 10553, 10556, 10620, 10769, 10770, 10775, 10776, 10777, 10778, 10780, 10811, 11061, 11177, 11258, 11671, 11697, 11749, 11752, 12178, 12188, 12243, 12244, 12247, 12248, 12253, 12270, 12273, 12281, 12284, 12302, 12326, 12327, 12331, 12332, 12334, 12336, 12340, 12355, 12383, 12384, 12407, 12408, 12498, 12499, 12501, 12503, 12653, 12747, 12773, 12902, 13102, 13115, 13144, 13146, 13172, 13173, 13174, 13188, 13199, 13200, 13201, 13204, 13205, 13206, 13210, 13219, 13221, 13235, 13236, 13253, 13310, 13504, 13505, 13506, 13510, 13512, 13513, 13519, 13527, 13541, 13558, 14073}

14360, 14654, 14656, 14657, 14663, 14667, 14668, 14676, 14691, 14703, 14705, 14721, 14729, 14731, 14732, 14807, 14808, 15095, 15097, 15101, 15106, 15141, 15154, 15155, 15158, 15159, 15160, 15161, 15162, 15163, 15588, 15747, 15959, 16010, 16110, 16128, 16175, 16176, 16363, 16528, 16550, 16554, 16559, 16560, 16561, 16562, 16563, 16565, 16575, 16576, 16649, 16651, 16686, 16873, 17085, 17089, 17154, 17487, 17738, 17794, 18060, 18061, 18066, 18149, 18150, 18151, 18159, 18301, 18790, 18794, 18862, 19159, 19162, 19165, 19193, 19195, 19208, 19299, 19303, 19376, 19403, 19478, 19640, 19910}

Radius = $5/(4 - \sqrt{3})$
{19395}

Radius = $(5\sqrt{3})/(-3 + 4\sqrt{3})$
{8313, 8345}

Radius = $4/\sqrt{3}$
{11777, 11786}

Radius = $\sqrt{13 - 4\sqrt{3}}$
{6227, 6263, 6271, 6319, 7725, 7732, 9882, 10814, 12753, 12803, 12805, 13269, 13282, 13502, 13523}

Radius = $5/2$
{6154, 12690, 12691, 13257}

Radius = $\sqrt{2*(2 + \sqrt{3})}$
{12376, 12892, 13288}

Radius = $11/4$
{19641}

Radius = 3
{5986, 8285, 9157, 12183, 12190, 12349, 12357, 12372, 12382, 12738, 12750, 12762, 12776, 12890, 12906, 12931, 12935, 13106, 13119, 13181, 13190, 13214, 13218, 13272, 13279, 13295, 13314, 13550, 14094, 14669, 15054, 15132, 15133, 15156, 15157, 15562, 19643}

Radius = $7/(4 - \sqrt{3})$
{19397}

Radius = $(7\sqrt{19 + 8\sqrt{3}})/13$
{8315, 8347}

Radius = $7/2$
{2037, 2038, 3029, 3030, 3031, 3032, 3033, 3034, 4409, 5213, 5975, 6044, 12732, 12757}

Radius = $\text{Sqrt}[7 + 4*\text{Sqrt}[3]]$
{7599, 8317, 8349, 10820, 11836, 13760, 13761, 13762, 13764, 13768, 13772, 13773, 13774, 13775, 13781, 13845, 19399}

Radius = 4
{5531, 5984, 7993, 8596, 9802, 9803, 9809, 9861, 9876, 9912, 9913, 9915, 9919, 11641, 12308, 12310, 12317, 12319, 12412, 12413, 12767, 13175, 13203, 13222, 13507, 13508, 13533, 14673, 14683, 15085, 15100, 15102, 15960, 16805, 17777, 17812, 17835, 17838, 17847, 19377}

Radius = $\text{Sqrt}[13 + 4*\text{Sqrt}[3]]$
{6226, 6262, 6269, 6320, 7726, 7733, 9883, 10815, 12754, 12804, 12806, 13270, 13283, 13503, 13525}

Radius = 5
{7724, 9963, 9964, 10119, 12661, 13243, 14692, 19164, 19642}

Radius = $2*\text{Sqrt}[2*(2 + \text{Sqrt}[3])]$
{13031, 19391}

Radius = 7
{12734, 12760, 13261}

Radius = $2*\text{Sqrt}[7 + 4*\text{Sqrt}[3]]$
{8305, 8337, 19385}

Radius = 8
{15096}

Radius = $\text{Sqrt}[97 + 56*\text{Sqrt}[3]]$
{7602, 8307, 8339, 10818, 11834, 19387}

Radius = 14
{12550, 12551, 13244}

```
Radius = Sqrt[229 + 132*Sqrt[3]]  
{12187, 12353, 12378, 12742, 12766, 12895, 12989, 12997, 13185, 13216, 13276, 13299}
```

```
Radius = 2*Sqrt[97 + 56*Sqrt[3]]  
{8309, 8341, 19389, 19483, 19485, 19508}
```