

Pensieve Header: What happens when you repeatedly add a number to its decimal “reverse”?

```
op[n_] := FromDigits[Reverse@IntegerDigits[n]]
pal[n_] := NestWhileList[(# + op[#]) &, n, (# ≠ op[#]) &]
pal[9998]
{9998, 18997, 98978, 186967, 956648, 1803307, 8836388}
pal[99998]
{99998, 189997, 989978, 1869967, 9569648, 18039307,
 88432388, 176755876, 855313547, 1600627105, 6617887166}
Sort[(Length[pal[#]] → #) & /@ Range[100]] // Last
25 → 98
pal[98]
{98, 187, 968, 1837, 9218, 17347, 91718, 173437, 907808, 1716517,
 8872688, 17735476, 85189247, 159487405, 664272356, 1317544822,
 3602001953, 7193004016, 13297007933, 47267087164, 93445163438,
 176881317877, 955594506548, 1801200002107, 8813200023188}
Print[pal[#]] & /@ Range[200]
{1}
{2}
{3}
{4}
{5}
{6}
{7}
{8}
{9}
{10, 11}
{11}
{12, 33}
{13, 44}
{14, 55}
{15, 66}
{16, 77}
{17, 88}
{18, 99}
{19, 110, 121}
{20, 22}
{21, 33}
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{22}
{23, 55}
{24, 66}
{25, 77}
{26, 88}
{27, 99}
{28, 110, 121}
{29, 121}
{30, 33}
{31, 44}
{32, 55}
{33}
{34, 77}
{35, 88}
{36, 99}
{37, 110, 121}
{38, 121}
{39, 132, 363}
{40, 44}
{41, 55}
{42, 66}
{43, 77}
{44}
{45, 99}
{46, 110, 121}
{47, 121}
{48, 132, 363}
{49, 143, 484}
{50, 55}
{51, 66}
{52, 77}
{53, 88}
{54, 99}
{55}
{56, 121}
{57, 132, 363}

{58, 143, 484}
 {59, 154, 605, 1111}
 {60, 66}
 {61, 77}
 {62, 88}
 {63, 99}
 {64, 110, 121}
 {65, 121}
 {66}
 {67, 143, 484}
 {68, 154, 605, 1111}
 {69, 165, 726, 1353, 4884}
 {70, 77}
 {71, 88}
 {72, 99}
 {73, 110, 121}
 {74, 121}
 {75, 132, 363}
 {76, 143, 484}
 {77}
 {78, 165, 726, 1353, 4884}
 {79, 176, 847, 1595, 7546, 14 003, 44 044}
 {80, 88}
 {81, 99}
 {82, 110, 121}
 {83, 121}
 {84, 132, 363}
 {85, 143, 484}
 {86, 154, 605, 1111}
 {87, 165, 726, 1353, 4884}
 {88}
 {89, 187, 968, 1837, 9218, 17 347, 91 718, 173 437, 907 808, 1 716 517,
 8 872 688, 17 735 476, 85 189 247, 159 487 405, 664 272 356, 1 317 544 822,
 3 602 001 953, 7 193 004 016, 13 297 007 933, 47 267 087 164, 93 445 163 438,
 176 881 317 877, 955 594 506 548, 1 801 200 002 107, 8 813 200 023 188}
 {90, 99}
 {91, 110, 121}

{92, 121}
{93, 132, 363}
{94, 143, 484}
{95, 154, 605, 1111}
{96, 165, 726, 1353, 4884}
{97, 176, 847, 1595, 7546, 14 003, 44 044}
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8 872 688, 17 735 476, 85 189 247, 159 487 405, 664 272 356, 1 317 544 822,
3 602 001 953, 7 193 004 016, 13 297 007 933, 47 267 087 164, 93 445 163 438,
176 881 317 877, 955 594 506 548, 1 801 200 002 107, 8 813 200 023 188}
{99}
{100, 101}
{101}
{102, 303}
{103, 404}
{104, 505}
{105, 606}
{106, 707}
{107, 808}
{108, 909}
{109, 1010, 1111}
{110, 121}
{111}
{112, 323}
{113, 424}
{114, 525}
{115, 626}
{116, 727}
{117, 828}
{118, 929}
{119, 1030, 1331}
{120, 141}
{121}
{122, 343}
{123, 444}
{124, 545}
{125, 646}

{126, 747}
{127, 848}
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{130, 161}
{131}
{132, 363}
{133, 464}
{134, 565}
{135, 666}
{136, 767}
{137, 868}
{138, 969}
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{140, 181}
{141}
{142, 383}
{143, 484}
{144, 585}
{145, 686}
{146, 787}
{147, 888}
{148, 989}
{149, 1090, 1991}
{150, 201, 303}
{151}
{152, 403, 707}
{153, 504, 909}
{154, 605, 1111}
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{156, 807, 1515, 6666}
{157, 908, 1717, 8888}
{158, 1009, 10 010, 11 011}
{159, 1110, 1221}
{160, 221, 343}
{161}

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{165, 726, 1353, 4884}
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{169, 1130, 1441}
{170, 241, 383}
{171}
{172, 443, 787}
{173, 544, 989}
{174, 645, 1191, 3102, 5115}
{175, 746, 1393, 5324, 9559}
{176, 847, 1595, 7546, 14 003, 44 044}
{177, 948, 1797, 9768, 18 447, 92 928, 175 857, 934 428, 1 758 867, 9 447 438,
17 794 887, 96 644 658, 182 289 327, 906 271 608, 1 712 444 217, 8 836 886 388}
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{181}
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{183, 564, 1029, 10 230, 13 431}
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{185, 766, 1433, 4774}
{186, 867, 1635, 6996}
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8 872 688, 17 735 476, 85 189 247, 159 487 405, 664 272 356, 1 317 544 822,
3 602 001 953, 7 193 004 016, 13 297 007 933, 47 267 087 164, 93 445 163 438,
176 881 317 877, 955 594 506 548, 1 801 200 002 107, 8 813 200 023 188}
{188, 1069, 10 670, 18 271, 35 552, 61 105, 111 221, 233 332}
{189, 1170, 1881}
{190, 281, 463, 827, 1555, 7106, 13 123, 45 254}
{191}
{192, 483, 867, 1635, 6996}
{193, 584, 1069, 10 670, 18 271, 35 552, 61 105, 111 221, 233 332}
{194, 685, 1271, 2992}

```
{195, 786, 1473, 5214, 9339}
```

```
$Aborted
```

```
pal[196]
```

```
$Aborted
```

Just the first 100 results:

```
NestWhileList[(Print[#]; # + op[#]) &, 196, (# ≠ op[#]) &, 1, 100]
```

```
196
```

```
887
```

```
1675
```

```
7436
```

```
13783
```

```
52514
```

```
94039
```

```
187088
```

```
1067869
```

```
10755470
```

```
18211171
```

```
35322452
```

```
60744805
```

```
111589511
```

```
227574622
```

```
454050344
```

```
897100798
```

```
1794102596
```

```
8746117567
```

```
16403234045
```

```
70446464506
```

```
130992928913
```

```
450822227944
```

```
900544455998
```

```
1800098901007
```

```
8801197801088
```

```
17602285712176
```

```
84724043932847
```

```
159547977975595
```

```
755127757721546
```

1 400 255 515 443 103
4 413 700 670 963 144
8 827 391 431 036 288
17 653 692 772 973 576
85 191 620 502 609 247
159 482 241 005 228 405
664 304 741 147 513 356
1 317 620 482 294 916 822
3 603 815 405 135 183 953
7 197 630 720 180 367 016
13 305 261 530 450 734 933
47 248 966 933 966 985 264
93 507 933 867 933 969 538
177 104 867 844 767 940 077
947 154 635 293 536 341 848
1 795 298 270 686 072 793 597
9 749 270 977 546 801 719 568
18 408 442 064 004 592 449 047
92 502 871 604 050 616 929 528
175 095 833 209 091 234 750 057
925 153 265 399 993 573 340 628
1 751 196 640 799 987 135 692 157
9 264 161 958 699 957 602 603 728
17 537 224 026 299 926 194 218 357
92 918 473 189 299 188 236 491 928
175 837 936 477 498 486 373 973 857
934 217 310 162 393 261 013 712 428
1 758 434 620 324 786 522 027 424 867
9 442 681 822 581 660 752 291 773 438
17 786 453 745 152 322 604 573 635 887
96 640 091 285 774 647 759 309 104 658
182 280 281 681 549 295 517 528 109 327
906 182 107 397 142 240 703 710 191 608
1 712 373 124 704 184 482 497 411 473 217
8 836 114 272 647 029 296 571 625 205 388
17 671 139 534 403 958 504 034 349 321 776

85 383 533 877 444 544 434 477 942 439 447
159 876 958 854 887 988 978 955 775 977 805
668 656 536 414 767 878 767 414 635 656 756
1 326 313 072 829 535 757 534 829 271 313 622
3 589 444 802 113 893 332 894 111 974 449 853
7 178 889 593 228 875 666 877 224 058 899 706
13 258 878 097 456 662 332 665 448 018 788 423
45 747 659 181 913 285 659 330 927 106 673 654
91 385 319 354 816 681 317 562 845 302 348 408
171 869 639 709 643 252 636 224 690 693 706 727
899 477 035 806 065 888 888 571 598 630 674 898
1 797 953 072 701 241 777 777 132 207 161 449 896
8 787 394 689 723 559 555 548 553 279 865 047 867
16 474 800 379 447 118 011 108 106 559 729 985 745
71 233 793 175 007 298 122 189 281 057 030 833 206
131 467 596 250 025 596 244 378 551 114 170 566 423
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1 713 431 572 655 604 770 948 087 405 557 266 223 327
8 946 658 200 210 652 579 438 861 471 120 017 566 498
17 893 315 300 422 394 267 788 614 031 240 046 132 996
87 816 479 304 635 435 956 564 863 353 640 397 472 867
164 643 958 609 270 772 803 130 816 807 280 794 934 745
712 083 455 691 979 390 834 439 093 880 187 654 281 206
1 314 265 912 473 067 781 768 877 187 859 384 208 661 423
4 555 933 937 312 655 599 557 549 065 463 126 404 285 554
9 111 757 983 526 301 209 015 109 021 025 263 797 681 108
17 123 625 957 151 502 418 030 218 042 061 517 695 252 227
89 348 885 628 667 526 499 233 299 462 576 693 647 884 398
178 697 760 268 335 052 998 466 598 925 153 376 306 768 796
876 565 363 941 686 582 894 131 498 175 687 238 374 565 667
1 643 130 837 774 473 154 788 262 996 461 373 387 738 131 345
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