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**INTEGERS WHICH ARE PALINDROMIC
IN BOTH DECIMAL AND BINARY NOTATION**

%N Palindromic in bases 2 and 10.
%R JRM 18 47 85.

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%O 1, 2

Integers that have palindromic representations in two different bases are exceedingly rare. I sought to find those numbers which were palindromic in both base ten and base two, since the decimal system is the standard for expressing numbers and binary is the smallest base of notation. (All such numbers must be odd, because binary palindromes begin and end with "1.")

During an exhaustive search of the first twenty million positive odd integers (1 through 39,999,999), twenty-seven of these unusual numbers were discovered. A subsequent search in the range from 40,000,001 to 500,799,999 proved fruitless and no higher binary/decimal palindromes have been found by myself. I would be pleased to learn of any success in the search for larger numbers of this type.

The results of my inquiry are presented in the accompanying table.

Decimal Value	Binary Value	Decimal Value	Binary Value
1	1	39993	1001110000111001
3	11	53235	1100111111110011
5	101	53835	1101001001001011
7	111	73737	1001000000001001
9	1001	*585585	10001110111101110001
33	100001	1758571	110101101010101101011
99	1100011	1934391	111011000010000110111
313	100111001	1979791	111100011010110001111
*585	1001001001	3129213	1011111011111101111101
717	1011001101	5071705	10011010110001101011001
747	1110100010111	5259525	10100000100000100000101
9009	10001100110001	5841485	10110010010001001001101
15351	11101111110111	13500531	110011100000000001110011
32223	111110111011111		

Typo, should be 747

* Note that both 585 and 585585 are palindromic in both bases.

corrected see JRM v18n3p 168 1985 and extended by Jean Meeus

719848917, 910373019, 939474939, 1290880921.

For more see JRM v18n3p 174-176

Two numbers were found having palindromic representations in *three* other bases:

$$(121)_{10} = (11111)_3 = (232)_7 = (171)_8$$

$$(373)_{10} = (11311)_4 = (565)_8 = (454)_9.$$

%N Palindromic in bases 3 and 10.

%R JRM 18 169 85.

%O 1,2

Yes

Table 1.

Decimal Value	Value in Base 3	Base 3	
		Decimal Value	Value in Base 3
1	1	1521251	2212021202122
2	2	2985892	12121200212121
4	11	4022204	21120100102112
8	22	4219124	21221100112212
121	11111	4251524	21222222222212
151	12121	4287824	22001211210022
212	21212	5737375	101210111012101
242	22222	7875787	112211010112211
484	122221	7949497	112221212122211
656	220022	27711772	1221010220101221
757	1001001	83155138	12210110201101221
29092	1110220111	112969211	21212120102121212
48884	2111001112	123464321	22121022122012122
74647	10210101201	211131112	112201021120102211
75457	10211111201	239060932	121122211112221121
76267	10212121201	387505783	10000001110000001
92929	11201110211	520080025	1100020121210200011
93739	11202120211	885626588	2021201110111021202
848848	1121010101211		

No

Table 1. (Cont'd.)

		<i>Base 4</i>	
<i>Decimal Value</i>	<i>Value in Base 4</i>	<i>Decimal Value</i>	<i>Value in Base 4</i>
1	1	506605	1323223231.
2	2	1801081	12313231321
3	3	2215122	20130303102
5	11	3826283	32212021223
55	313	3866683	32300000323
373	11311	5051505	103101101301
393	12021	5226225	103323323301
666	22122	5259525	110010010011
787	30103	5297925	110031130011
939	32223	5614165	111122221111
7997	1330331	5679765	111222222111
53235	30333303	53822835	3031110111303
55255	31133113	623010326	211020212020112
55655	31211213	954656459	320321232123023
57675	32011023		

No

		<i>Base 5</i>	
<i>Decimal Value</i>	<i>Value in Base 5</i>	<i>Decimal Value</i>	<i>Value in Base 5</i>
1	1	18881	1101011
2	2	10088001	10040304001
3	3	10400401	10130303101
4	4	27711772	24043234042
6	11	30322303	30230303203
88	323	47633674	44143234144
252	2002	65977956	113342243311
282	2112	808656808	3124004004213
626	10001	831333138	3200310130023
676	10201	831868138	3200424240023
1221	14341	836131638	3203022203023
15751	1001001	836181638	3203030303023

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Table 1. (Cont'd.)

<i>Decimal Value</i>	<i>Value in Base 6</i>	<i>Base 6</i>	
		<i>Decimal Value</i>	<i>Value in Base 6</i>
1	1	4298924	232050232
2	2	4516154	240444042
3	3	4565654	241505142
4	4	4598954	242323242
5	5	4849484	251535152
7	11	5100015	301151103
55	131	5182815	303030303
111	303	5400045	311424113
141	353	5433345	312242213
191	515	5482845	313303313
343	1331	5733375	322515223
434	2002	5766675	323333323
777	3333	5799975	324151423
868	4004	6901096	403525304
1441	10401	6934396	404343404
7667	55255	6983896	405404504
7777	100001	8164618	450555054
22022	245542	9081809	522353225
39893	504405	15266251	1303113031
74647	1333331	24466442	2232222322
168861	3341433	103656301	14141414141
808808	25200252	104888401	14224042241
909909	31300313	108151801	14422022441
1867681	104010401	290222092	44444244444
3097903	150222051	310393013	50444444405
4232324	230414032	342050243	53535153535
4265624	231232132		

NO

Table 1. (Cont'd.)

<i>Decimal Value</i>	<i>Base 7</i>		<i>Value in Base 7</i>
	<i>Value in Base 7</i>	<i>Decimal Value</i>	
1	1	2137312	24111142
2	2	4602064	54055045
3	3	6597956	110040011
4	4	6958596	113101311
5	5	9470749	143333341
6	6	61255216	1342442431
8	11	230474032	5465665645
121	232	466828664	14365656341
171	333	485494584	15013431051
242	464	638828836	21554645512
292	565	657494756	22202420222
16561	66166	858474858	30162626103
65656	362263		

<i>Decimal Value</i>	<i>Base 8</i>		<i>Value in Base 8</i>
	<i>Value in Base 8</i>	<i>Decimal Value</i>	
1	1	13331	32023
2	2	26462	63536
3	3	26662	64046
4	4	30103	72627
5	5	30303	73137
6	6	207702	625526
7	7	628826	2314132
9	11	660066	2411142
121	171	1496941	5553555
292	444	1935391	7304037
333	515	1970791	7411147
373	565	4198914	20011002
414	636	55366355	323151323
585	1111	130535031	761747167
3663	7117	532898235	3760660673
8778	21112	719848917	5272002725
13131	31513	799535997	5751771575

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Table 1. (Cont'd.)

<i>Decimal Value</i>	<i>Value in Base 9</i>	<i>Base 9</i>	
		<i>Decimal Value</i>	<i>Value in Base 9</i>
1	1	1713171	3201023
2	2	1721271	3213123
3	3	1828281	3385833
4	4	1877781	3471743
5	5	1885881	3483843
6	6	2401042	4458544
7	7	2434342	4520254
8	8	2442442	4532354
191	232	2450542	4544454
282	343	3106013	5753575
373	454	3114113	5765675
464	565	3122213	5777775
555	676	3163613	5851585
646	787	3171713	5863685
656	808	3303033	6183816
6886	10401	3360633	6281826
25752	38283	65666656	146505641
27472	41614	167191761	378535873
42324	64046	181434181	418353814
50605	76367	232000232	534484435
626626	1154511	382000283	877717778
1540451	2807082		