Steven Clontz

mathematician, professor, programmer, puzzler

steven.clontz@gmail.com
http://clontz.org

Theorem: An integer is a multiple of nine iff the sum of its digits is a multiple of nine.

Proof: Express the integer as the sum of its digits: $d_0 + 10d_1 + 100d_2 + \ldots + 10^n d_n$. This may be grouped into the sum of its digits $d_0 + d_1 + \ldots + d_n$ plus the sum $9d_1 + 99d_2 + \ldots + (10^n - 1)d_n$. Since each $10^i - 1$ is divisible by 9, the result follows. □

clontz.org/card

45	27	81	54	54	18	72	21	47	18	33	36	45	73	36	76	36	49	90	72	63	36	63	54	36
72	25	73	20	98	10	45	57	59	26	90	90	18	10	71	90	76	22	54	43	62	11	42	49	63
54	52	63	90	18	37	18	70	72	90	80	54	45	78	51	36	36	37	18	47	45	54	45	66	54
81	48	18	45	72	43	90	23	91	60	31	83	89	50	27	75	54	20	36	24	81	72	18	40	36
90	26	90	27	72	68	18	25	72	21	63	81	29	63	54	84	63	78	18	39	72	72	18	92	54
27	67	22	19	77	58	54	20	72	83	27	63	63	63	36	18	45	44	81	95	49	71	13	66	90
36	72	90	27	72	18	72	13	36	86	90	13	63	52	81	97	63	41	45	54	63	90	45	63	27
73	14	42	34	56	15	84	11	82	50	18	84	45	27	27	81	54	79	64	93	73	22	19	61	85
54	19	51	27	10	78	36	31	90	81	22	49	45	56	70	63	36	27	10	54	72	39	81	11	75
72	84	75	27	69	13	25	96	32	54	29	75	98	42	18	17	84	97	63	22	18	36	63	40	42
18	63	16	90	21	25	63	87	45	90	36	72	36	40	26	18	48	63	45	47	45	27	18	54	85
10	60	27	54	59	55	44	27	73	37	24	92	30	73	74	54	27	38	72	94	54	43	36	63	74
61	29	77	19	63	27	27	54	17	81	53	53	53	31	45	85	95	36	36	63	90	66	72	16	36
81	79	36	73	45	45	35	17	72	36	52	90	90	30	36	27	38	59	90	48	29	39	45	49	45
97	54	54	70	57	65	18	83	41	63	63	30	72	95	81	36	72	27	28	71	82	10	81	54	45
38	36	24	14	22	81	75	80	56	90	18	63	27	72	33	23	45	18	45	43	35	49	45	18	81
27	18	18	56	45	27	18	45	18	49	72	27	27	43	22	36	18	18	63	27	36	81	75	81	27
46	56	79	55	76	49	19	32	45	27	36	88	62	81	27	47	72	23	14	44	45	16	77	89	55
72	18	45	36	27	81	18	20	34	72	54	54	36	81	56	72	18	87	45	78	54	31	17	93	25
27	73	43	98	50	76	81	46	82	42	17	45	63	13	36	25	72	24	19	97	27	54	27	72	27
90	11	81	45	54	82	36	66	46	20	65	46	53	73	85	63	90	45	72	63	81	72	18	45	92
36	28	27	36	36	84	81	53	36	50	81	52	86	26	19	23	90	26	38	17	18	54	77	72	95
81	70	27	36	63	47	54	96	62	81	26	13	87	72	24	13	77	10	72	48	24	72	71	89	24
90	32	29	17	19	12	54	88	30	90	72	81	27	18	45	73	11	72	54	63	81	63	33	63	81
27	90	36	63	45	81	90	77	27	54	18	33	85	72	36	54	90	81	27	36	70	95	18	49	72