

by J. van der Linden
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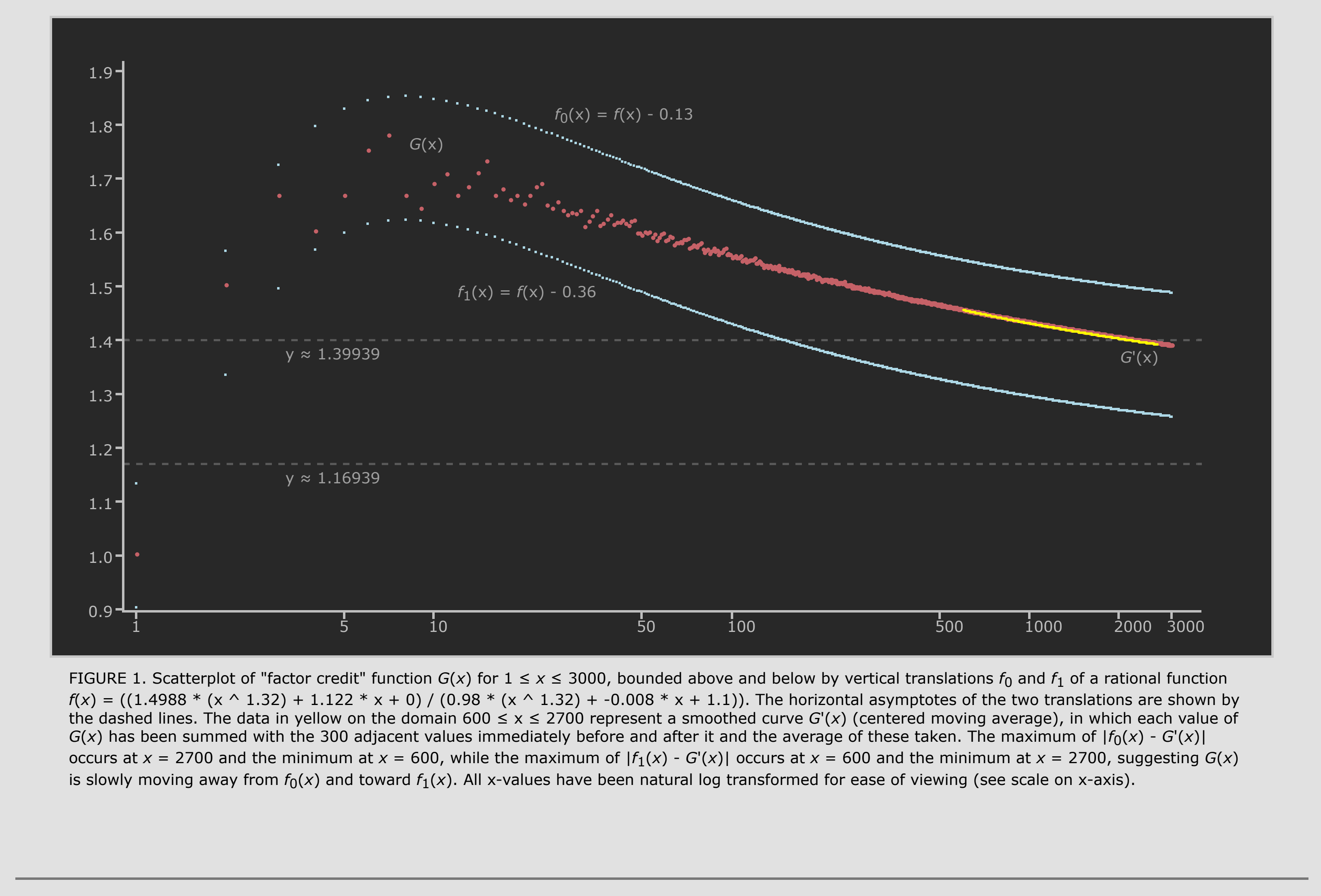
composites to the factors of $G(x)$ contributed by each integer n for a given value of x and $G(x)$ was a function $G(x)$, which

Plotting $G(x)$ for $1 \leq x \leq 3000$ revealed a sharp if chaotic rise to a sudden peak (at $7.777777\dots$) followed by a gradual stabilizing and decay (Figure 1). The shape of the curve seemed consistent with either a rational function (i.e. ratio of polynomials) or perhaps some logarithmic function $\log(x) \times I$. I plotted translations of a rational function on the same graph and they appeared to provide reasonably good upper and lower bounds for $G(x)$ in the chosen interval, but I was unable to extend the investigations to a larger interval. The horizontal asymptotes of these translated rational functions were located at $y \approx 1.39939$ and $y \approx 1.16939$, and I wondered if $G(x)$ might converge on a value between these, but I was unsure.

It seems like this must be related to the prime counting function...maybe a variation of the same? I get the impression that what it's counting is connected to that, but the exact nature of the connection isn't clear to me. I'm curious to learn more, such as the formal name for the function, whether it does converge (and to what value if so), and what kind of regression provides the best fit for the curve.

	n										$S(x)$	$S_{comp}(x)$	$G(x)$
	1	2	3	4	5	6	7	8	9	10			
1	1										1	1	1
2	2	1									3	2	1.5
3	3	1	1								5	3	1.66666...
4	4	2	1	1							8	5	1.6

TABLE 1. Contribution of each integer n in the range $[1, x]$ to the total number of factors of all integers in the range. Values for $1 \leq x \leq 10$ are shown. The rightmost columns give the total factor count $S(x)$ for all integers in the range $[1, x]$, the smaller factor count $S_{\text{comp}}(x)$ contributed by non-primes only in the same range, and the ratio $G(x) = S(x) / S_{\text{comp}}(x)$.



s to D.J. Pfeiffer, who provided a [list of primes](#) used in the calculations.

Appendix

1	1	601	1.452337136547663	1202	1.
2	1	602	1.452608376193975	1203	1.
3	1.5	603	1.4526779163609684	1204	1.
4	1.6666666666666667	604	1.4527472527472527	1205	1.
5	1.6	605	1.4528163862472567	1206	1.
6	1.6666666666666667	606	1.4530850675428988	1207	1.

2050787528126
22365038560412
21081341248194
22507213850593
23930802498799
24855861627161
251899251121166

23	1.68000000000000000000	624	1.450897571
24	1.647058023294117	625	1.450615314
25	1.6415094339622642	626	1.451091053
26	1.6545454545454545	627	1.451262272
27	1.6379310344827587	628	1.451330532
28	1.6290322580645162	629	1.451714485
29	1.62400826006240	630	1.44906537

1	1.63225941767406	631	1.45051634727167	1222	1.41619386784966	1813	1.46222166599188	2434	1.39558486862698
2	1.60810810810811	632	1.45051634727167	1223	1.41619386784966	1814	1.46222166599188	2435	1.39558486862698
3	1.60810810810811	633	1.45051634727167	1224	1.41619386784966	1815	1.46222166599188	2436	1.39558486862698
4	1.60810810810811	634	1.45051634727167	1225	1.41619386784966	1816	1.46222166599188	2437	1.39558486862698
5	1.60810810810811	635	1.45051634727167	1226	1.41619386784966	1817	1.46222166599188	2438	1.39558486862698
6	1.60810810810811	636	1.45051634727167	1227	1.41619386784966	1818	1.46222166599188	2439	1.39558486862698
7	1.60810810810811	637	1.45051634727167	1228	1.41619386784966	1819	1.46222166599188	2440	1.39558486862698
8	1.60810810810811	638	1.45051634727167	1229	1.41619386784966	1820	1.46222166599188	2441	1.39558486862698
9	1.60810810810811	639	1.45051634727167	1230	1.41619386784966	1821	1.46222166599188	2442	1.39558486862698
10	1.60810810810811	640	1.45051634727167	1231	1.41619386784966	1822	1.46222166599188	2443	1.39558486862698
11	1.60810810810811	641	1.45051634727167	1232	1.41619386784966	1823	1.46222166599188	2444	1.39558486862698
12	1.60810810810811	642	1.45051634727167	1233	1.41619386784966	1824	1.46222166599188	2445	1.39558486862698
13	1.60810810810811	643	1.45051634727167	1234	1.41619386784966	1825	1.46222166599188	2446	1.39558486862698
14	1.60810810810811	644	1.45051634727167	1235	1.41619386784966	1826	1.46222166599188	2447	1.39558486862698
15	1.60810810810811	645	1.45051634727167	1236	1.41619386784966	1827	1.46222166599188	2448	1.39558486862698
16	1.60810810810811	646	1.45051634727167	1237	1.41619386784966	1828	1.46222166599188	2449	1.39558486862698
17	1.60810810810811	647	1.45051634727167	1238	1.41619386784966	1829	1.46222166599188	2450	1.39558486862698
18	1.60810810810811	648	1.45051634727167	1239	1.41619386784966	1830	1.46222166599188	2451	1.39558486862698
19	1.60810810810811	649	1.45051634727167	1240	1.41619386784966	1831	1.46222166599188	2452	1.39558486862698
20	1.60810810810811	650	1.45051634727167	1241	1.41619386784966	1832	1.46222166599188	2453	1.39558486862698
21	1.60810810810811	651	1.45051634727167	1242	1.41619386784966	1833	1.46222166599188	2454	1.39558486862698
22	1.60810810810811	652	1.45051634727167	1243	1.41619386784966	1834	1.46222166599188	2455	1.39558486862698
23	1.60810810810811	653	1.45051634727167	1244	1.41619386784966	1835	1.46222166599188	2456	1.39558486862698
24	1.60810810810811	654	1.45051634727167	1245	1.41619386784966	1836	1.46222166599188	2457	1.39558486862698
25	1.60810810810811	655	1.45051634727167	1246	1.41619386784966	1837	1.46222166599188	2458	1.39558486862698
26	1.60810810810811	656	1.45051634727167	1247	1.41619386784966	1838	1.46222166599188	2459	1.39558486862698
27	1.60810810810811	657	1.45051634727167	1248	1.41619386784966	1839	1.46222166599188	2460	1.39558486862698
28	1.6081081081081	658	1.45051634727167	1249	1.41619386784966	1840	1.46222166599188	2461	1.39558486862698
29	1.60810810810811	659	1.45051634727167	1250	1.41619386784966	1841	1.46222166599188	2462	1.39558486862698
30	1.60810810810811	660	1.45051634727167	1251	1.41619386784966	1842	1.46222166599188	2463	1.39558486862698
31	1.60810810810811	661	1.45051634727167	1252	1.41619386784966	1843	1.46222166599188	2464	1.39558486862698
32	1.60810810810811	662	1.45051634727167	1253	1.41619386784966	1844	1.46222166599188	2465	1.39558486862698
33	1.60810810810811	663	1.45051634727167	1254	1.41619386784966	1845	1.46222166599188	2466	1.39558486862698
34	1.60810810810811	664	1.45051634727167	1255	1.41619386784966	1846	1.46222166599188	2467	1.39558486862698
35	1.60810810810811	665	1.45051634727167	1256	1.41619386784966	1847	1.46222166599188	2468	1.39558486862698
36	1.60810810810811	666	1.45051634727167	1257	1.41619386784966	1848	1.46222166599188	2469	1.39558486862698
37	1.60810810810811	667	1.45051634727167	1258	1.41619386784966	1849	1.46222166599188	2470	1.39558486862698
38	1.60810810810811	668	1.45051634727167	1259	1.41619386784966	1850	1.46222166599188	2471	1.39558486862698
39	1.60810810810811	669	1.45051634727167	1260	1.41619386784966	1851	1.46222166599188	2472	1.39558486862698
40	1.60810810810811	670	1.45051634727167	1261	1.41619386784966	1852	1.46222166599188	2473	1.39558486862698
41	1.60810810810811	671	1.45051634727167	1262	1.41619386784966	1853	1.46222166599188	2474	1.39558486862698
42	1.60810810810811	672	1.45051634727167	1263	1.41619386784966	1854	1.46222166599188	2475	1.39558486862698
43	1.60810810810811	673	1.45051634727167	1264	1.41619386784966	1855	1.46222166599188	2476	1.39558486862698
44	1.60810810810811	674	1.45051634727167	1265	1.41619386784966	1856	1.46222166599188	2477	1.39558486862698
45	1.60810810810811	675	1.45051634727167	1266	1.41619386784966	1857	1.46222166599188	2478	1.39558486862698
46	1.60810810810811	676	1.45051634727167	1267	1.41619386784966	1858	1.46222166599188	2479	1.39558486862698
47	1.60810810810811	677	1.45051634727167	1268	1.41619386784966	1859	1.46222166599188	2480	1.39558486862698
48	1.60810810810811	678	1.45051634727167	1269	1.41619386784966	1860	1.46222166599188	2481	1.39558486862698
49	1.60810810810811	679	1.45051634727167	1270	1.41619386784966	1861	1.46222166599188	2482	1.39558486862698
50	1.60810810810811	680	1.45051634727167	1271	1.41619386784966	1862	1.46222166599188	2483	1.39558486862698
51	1.60810810810811	681	1.45051634727167	1272	1.41619386784966	1863	1.46222166599188	2484	1.39558486862698
52	1.60810810810811	682	1.45051634727167	1273	1.41619386784966	1864	1.46222166599188	2485	1.39558486862698
53	1.60810810810811	683	1.45051634727167	1274	1.41619386784966	1865	1.46222166599188	2486	1.39558486862698
54	1.60810810810811	684	1.45051634727167	1275	1.41619386784966	1866	1.46222166599188	2487	1.39558486862698
55	1.60810810810811	685	1.45051634727167	1276	1.41619386784966	1867	1.46222166599188	2488	1.39558486862698
56	1.60810810810811	686	1.45051634727167	1277	1.41619386784966	1868	1.46222166599188	2489	1.39558486862698
57	1.60810810810811	687	1.45051634727167	1278	1.41619386784966	1869	1.46222166599188	2490	1.39558486862698
58	1.60810810810811	688	1.45051634727167	1279	1.41619386784966	1870	1.46222166599188	2491	1.39558486862698
59	1.60810810810811	689	1.45051634727167	1280	1.41619386784966	1871	1.46222166599188	2492	1.39558486862698
60	1.60810810810811	690	1.45051634727167	1281	1.41619386784966	1872	1.46222166599188	2493	1.39558486862698
61	1.60810810810811	691	1.45051634727167	1282	1.41619386784966	1873	1.46222166599188	2494	1.39558486862698
62	1.60810810810811	692	1.45051634727167	1283	1.41619386784966	1874	1.46222166599188	2495	1.39558486862698
63	1.60810810810811	693	1.45051634727167	1284	1.41619386784966	1875	1.46222166599188	2496	1.39558486862698
64	1.60810810810811	694	1.45051634727167	1285	1.41619386784966	1876	1.46222166599188	2497	1.39558486862698
65	1.60810810810811	695	1.45051634727167	1286	1.41619386784966	1877	1.46222166599188	2498	1.39558486862698
66	1.60810810810811	696	1.45051634727167	1287	1.41619386784966	1878	1.46222166599188	2499	1.39558486862698
67	1.60810810810811	697	1.45051634727167	1288	1.41619386784966	1879	1.46222166599188	2500	1.39558486862698
68	1.60810810810811	698	1.45051634727167	1289	1.41619386784966	1880	1.46222166599188	2501	1.39558486862698
69	1.60810810810811	699	1.45051634727167	1290	1.41619386784966	1881	1.46222166599188	2502	1.39558486862698
70	1.60810810810811	700	1.45051634727167	1291	1.41619386784966	1882	1.46222166599188	2503	1.39558486862698
71	1.60810810810811	701	1.45051634727167	1292	1.41619386784966	1883	1.46222166599188	2504	1.39558486862698
72	1.60810810810811	702	1.45051634727167	1293	1.41619386784966	1884	1.46222166599188	2505	1.39558486862698
73	1.60810810810811	703	1.45051634727167	1294	1.41619386784966	1885	1.46222166599188	2506	1.39558486862698
74	1.60810810810811	704	1.45051634727167	1295	1.41619386784966	1886	1.46222166599188	2507	1.39558486862698
75	1.60810810810811	705	1.45051634727167	1296	1.41619386784966	1887	1.46222166599188	2508	1.39558486862698
76	1.60810810810811	706	1.45051634727167	1297	1.41619386784966	1888	1.46222166599188	2509	1.39558486862698
77	1.60810810810811	707	1.45051634727167	1298	1.41619386784966	1889	1.46222166599188	2510	1.39558486862698
78	1.60810810810811	708	1.45051634727167	1299	1.41619386784966	1890	1.46222166599188	2511	1.39558486862698
79	1.60810810810811	709	1.45051634727167	1300	1.41619386784966	1891	1.46222166599188	2512	1.39558486862698
80	1.60810810810811	710	1.45051634727167	1301	1.41619386784966	1892	1.46222166599188	2513	1.39558486862698
81	1.60810810810811	711	1.45051634727167	1302	1.41619386784966	1893	1.46222166599188	2514	1.39558486862698
82	1.60810810810811	712	1.45051634727167	1303	1.41619386784966	1894	1.46222166599188	2515	1.39558486862698
83									