Gompertz Curve

Name: Jaswinderpal Singh Class: M.Sc. Statistics Sem 1

With \log base 10

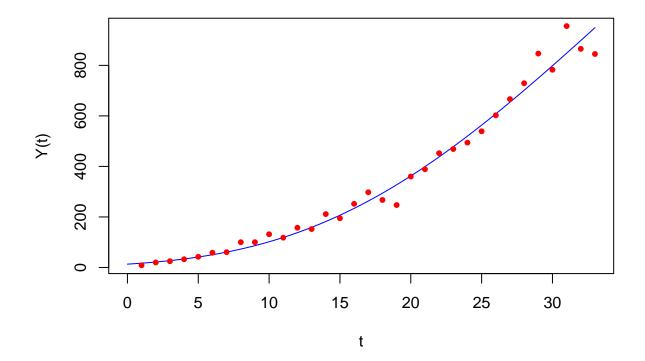
Year Consumption t log10Y 1920 8.7 1 0.9395193 1921 19.8 2 1.2966652 1922 24.7 3 1.3926970 1923 32.5 4 1.5118834 1924 42.2 5 1.6253125 1925 58.2 6 1.7649230 1926 60.6 7 1.7824726 1927 100.0 8 2.0000000 1928 100.1 9 2.0004341 1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1				
1921 19.8 2 1.2966652 1922 24.7 3 1.3926970 1923 32.5 4 1.5118834 1924 42.2 5 1.6253125 1925 58.2 6 1.7649230 1926 60.6 7 1.7824726 1927 100.0 8 2.0000000 1928 100.1 9 2.0004341 1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 <td>Year</td> <td>Consumption</td> <td>t</td> <td>$\log 10 Y$</td>	Year	Consumption	t	$\log 10 Y$
1922 24.7 3 1.3926970 1923 32.5 4 1.5118834 1924 42.2 5 1.6253125 1925 58.2 6 1.7649230 1926 60.6 7 1.7824726 1927 100.0 8 2.00000000 1928 100.1 9 2.0004341 1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226<	1920	8.7		0.9395193
1923 32.5 4 1.5118834 1924 42.2 5 1.6253125 1925 58.2 6 1.7649230 1926 60.6 7 1.7824726 1927 100.0 8 2.0000000 1928 100.1 9 2.0004341 1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876	1921	19.8	2	1.2966652
1924 42.2 5 1.6253125 1925 58.2 6 1.7649230 1926 60.6 7 1.7824726 1927 100.0 8 2.0000000 1928 100.1 9 2.0004341 1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.65555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939	1922	24.7	3	1.3926970
1925 58.2 6 1.7649230 1926 60.6 7 1.7824726 1927 100.0 8 2.0000000 1928 100.1 9 2.0004341 1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 <td>1923</td> <td>32.5</td> <td>4</td> <td>1.5118834</td>	1923	32.5	4	1.5118834
1926 60.6 7 1.7824726 1927 100.0 8 2.0000000 1928 100.1 9 2.0004341 1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 </td <td>1924</td> <td>42.2</td> <td>5</td> <td>1.6253125</td>	1924	42.2	5	1.6253125
1927 100.0 8 2.0000000 1928 100.1 9 2.0004341 1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4	1925	58.2	6	1.7649230
1928 100.1 9 2.0004341 1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.	1926	60.6	7	1.7824726
1929 131.5 10 2.1189258 1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729	1927	100.0	8	2.0000000
1930 117.9 11 2.0715138 1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846	1928	100.1	9	2.0004341
1931 157.3 12 2.1967287 1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782	1929	131.5	10	2.1189258
1932 152.0 13 2.1818436 1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955	1930	117.9	11	2.0715138
1933 211.3 14 2.3248995 1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865	1931	157.3	12	2.1967287
1934 194.8 15 2.2895890 1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1932	152.0	13	2.1818436
1935 252.1 16 2.4015728 1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1933	211.3	14	2.3248995
1936 297.6 17 2.4736329 1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1934	194.8	15	2.2895890
1937 267.1 18 2.4266739 1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1935	252.1	16	2.4015728
1938 247.1 19 2.3928727 1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1936	297.6	17	2.4736329
1939 359.8 20 2.5560612 1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1937	267.1	18	2.4266739
1940 388.7 21 2.5896145 1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1938	247.1	19	2.3928727
1941 452.4 22 2.6555226 1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1939	359.8	20	2.5560612
1942 468.8 23 2.6709876 1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1940	388.7	21	2.5896145
1943 494.2 24 2.6939027 1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1941	452.4	22	2.6555226
1944 539.1 25 2.7316693 1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1942	468.8	23	2.6709876
1945 602.4 26 2.7798850 1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1943	494.2	24	2.6939027
1946 666.5 27 2.8238002 1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1944	539.1	25	2.7316693
1947 729.3 28 2.8629062 1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1945	602.4	26	2.7798850
1948 846.7 29 2.9277296 1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1946	666.5	27	2.8238002
1949 782.7 30 2.8935953 1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1947	729.3	28	2.8629062
1950 955.5 31 2.9802307 1951 865.4 32 2.9372169	1948	846.7	29	2.9277296
1951 865.4 32 2.9372169	1949	782.7	30	2.8935953
	1950	955.5	31	2.9802307
1952 845.0 33 2.9268567	1951	865.4	32	2.9372169
	1952	845.0	33	2.9268567

- ## [1] 18.50435
- ## [1] 26.48901
- ## [1] 31.22878
- ## [1] -2.347442
- ## [1] 3.468371
- ## [1] 2940.163
- ## [1] 0.9536942
- ## [1] 0.004493221

[1] 118.8252

[1] 399.0587

[1] 1356.276



 $S_1 = 18.5043465$ $S_2 = 26.4890115$ $S_3 = 31.2287802$

a = 0.0044932

b = 0.9536942

k = 2940.163

Reqd Gompertz Curve is

$$Y_t = ka^{b^t}$$

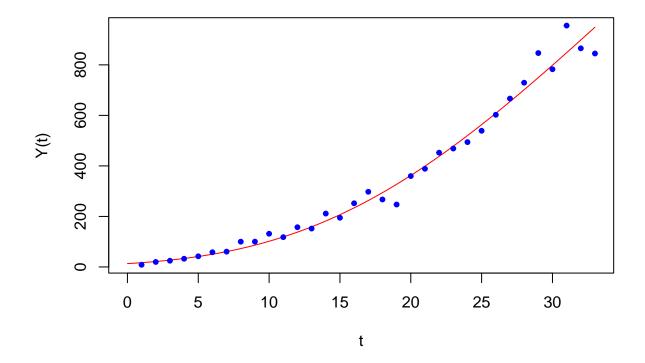
Trend Values:

Year	Trend Value
1930	118.825224
1940	399.058693
1960	1356.2762584

With log base e

Year	Consumption	t	lnY
1920	8.7	1	2.163323
1921	19.8	2	2.985682
1922	24.7	3	3.206803
1923	32.5	4	3.481240
1924	42.2	5	3.742420
1925	58.2	6	4.063885
1926	60.6	7	4.104295
1927	100.0	8	4.605170
1928	100.1	9	4.606170
1929	131.5	10	4.879007
1930	117.9	11	4.769837
1931	157.3	12	5.058155
1932	152.0	13	5.023881
1933	211.3	14	5.353279
1934	194.8	15	5.271973
1935	252.1	16	5.529826
1936	297.6	17	5.695750
1937	267.1	18	5.587623
1938	247.1	19	5.509793
1939	359.8	20	5.885548
1940	388.7	21	5.962808
1941	452.4	22	6.114567
1942	468.8	23	6.150176
1943	494.2	24	6.202940
1944	539.1	25	6.289901
1945	602.4	26	6.400922
1946	666.5	27	6.502040
1947	729.3	28	6.592085
1948	846.7	29	6.741346
1949	782.7	30	6.662749
1950	955.5	31	6.862235
1951	865.4	32	6.763192
1952	845.0	33	6.739337

- ## [1] 42.60783
- ## [1] 60.9932
- ## [1] 71.90692
- ## [1] -5.405186
- ## [1] 7.98622
- ## [1] 2940.163
- ## [1] 0.004493221
- ## [1] 0.9536942
- ## [1] 118.8252
- ## [1] 399.0587
- ## [1] 1356.276



 $S_1 = 42.6078323$ $S_2 = 60.9932029$ $S_3 = 71.9069237$

a = 0.0044932

b = 0.9536942

k = 2940.163

Reqd Gompertz Curve is

$$Y_t = ka^{b^t}$$

Trend Values:

Year	Trend Value
1930	118.825224
1940	399.058693
1960	1356.2762584