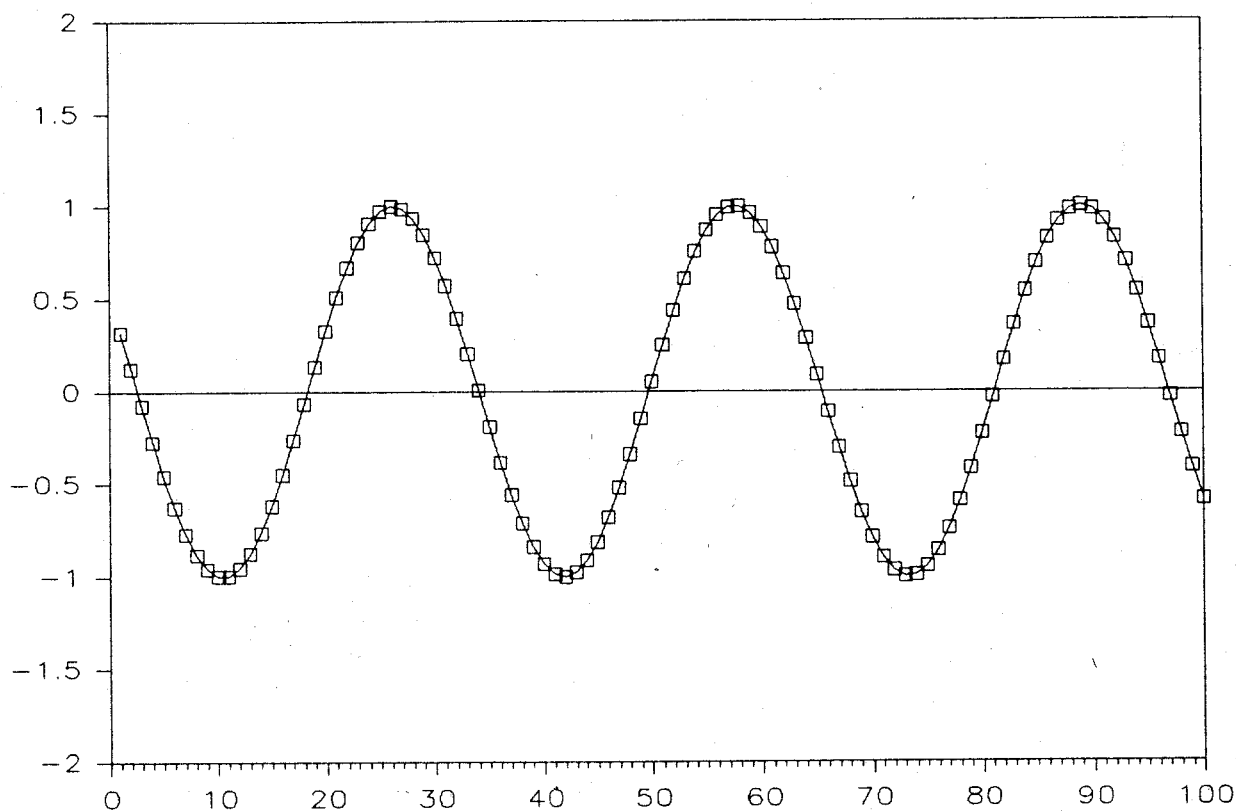


PŘÍKLAD 1.1 (Current Through a Resistor). If a sinusoidal voltage $v(t) = a \cos(\nu t + \theta)$ is applied to a resistor of resistance r and the current recorded continuously we obtain a continuous time series

$$x(t) = r^{-1} a \cos(\nu t + \theta).$$

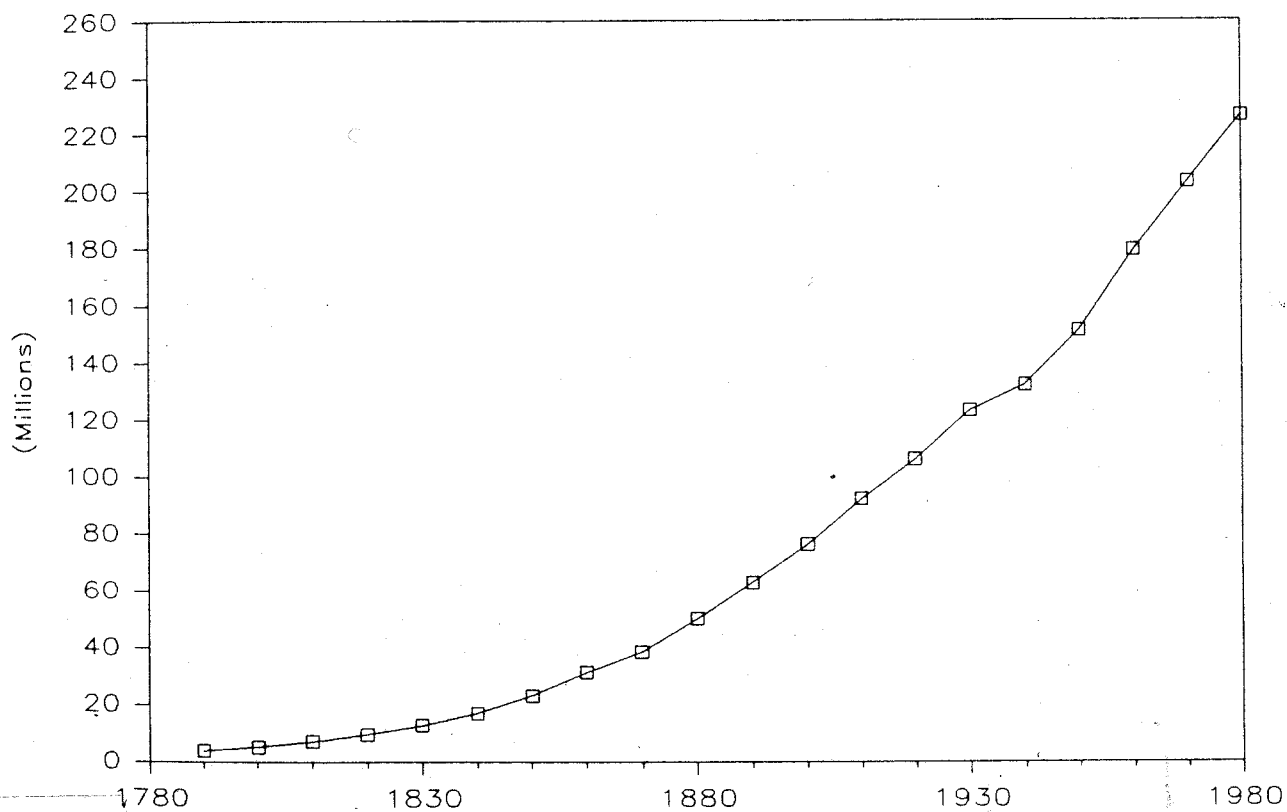
If observations are made only at times $1, 2, \dots$, the resulting time series will be discrete. Time series of this particularly simple type will play a fundamental role in our later study of stationary time series.



OBR. 1.1. 100 observations of the series $x(t) = \cos(.2t + \pi/3)$.

PŘÍKLAD 1.2 (Population x_t of the U.S.A., 1790–1980).

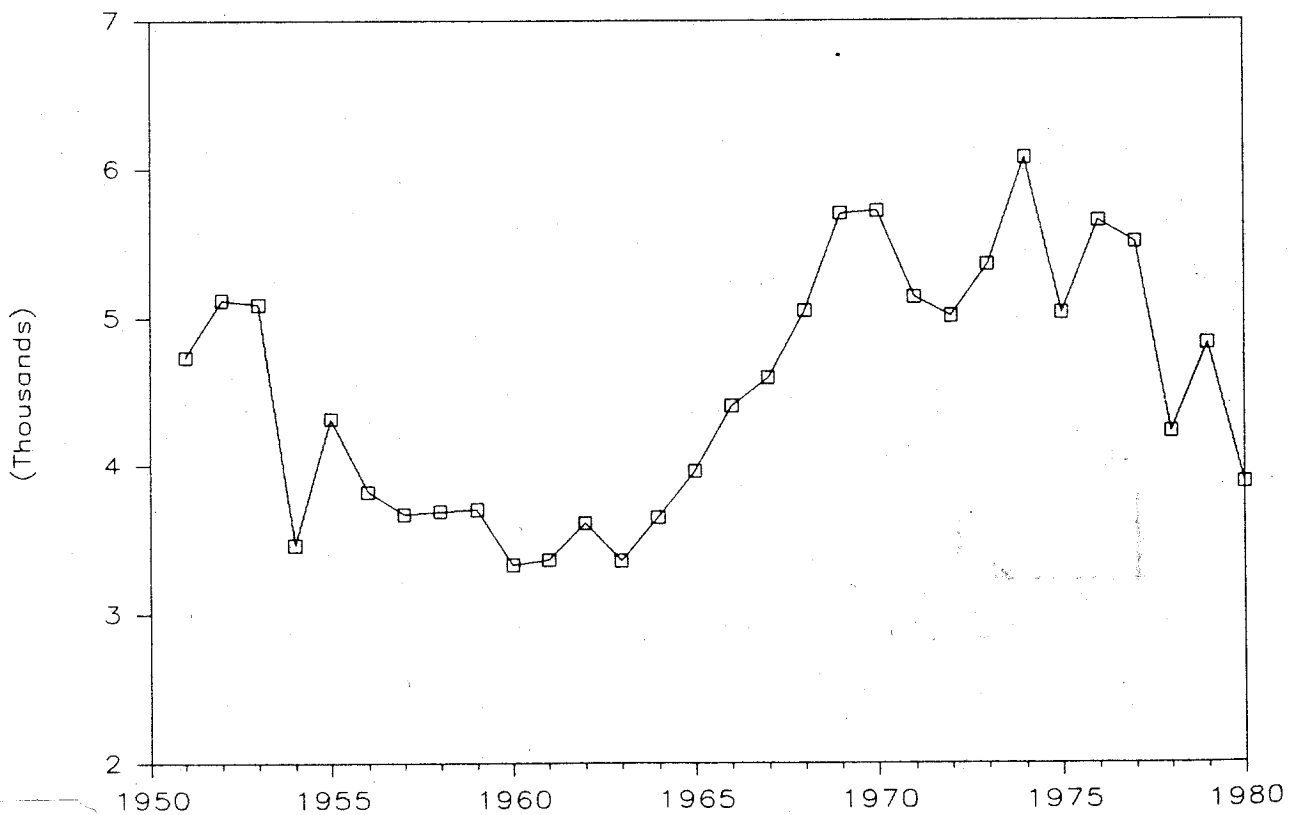
t	x_t	t	x_t
1790	3,929,214	1890	62,979,766
1800	5,308,483	1900	76,212,168
1810	7,239,881	1910	92,228,496
1820	9,638,453	1920	106,021,537
1830	12,860,702	1930	123,202,624
1840	17,063,353	1940	132,164,569
1850	23,191,876	1950	151,325,798
1860	31,443,321	1960	179,323,175
1870	38,558,371	1970	203,302,031
1880	50,189,209	1980	226,545,805



OPR. 1.2. Population of the U.S.A. at ten-year intervals, 1790–1980 (U.S. Bureau of the Census).

PŘÍKLAD 1.3 (Strikes in the U.S.A., 1951–1980).

t	x_t	t	x_t
1951	4737	1966	4405
1952	5117	1967	4595
1953	5091	1968	5045
1954	3468	1969	5700
1955	4320	1970	5716
1956	3825	1971	5138
1957	3673	1972	5010
1958	3694	1973	5353
1959	3708	1974	6074
1960	3333	1975	5031
1961	3367	1976	5648
1962	3614	1977	5506
1963	3362	1978	4230
1964	3655	1979	4827
1965	3963	1980	3885



OBJ. 1.3. Strikes in the U.S.A., 1951–1980 (Bureau of Labor Statistics, U.S. Labor Department).

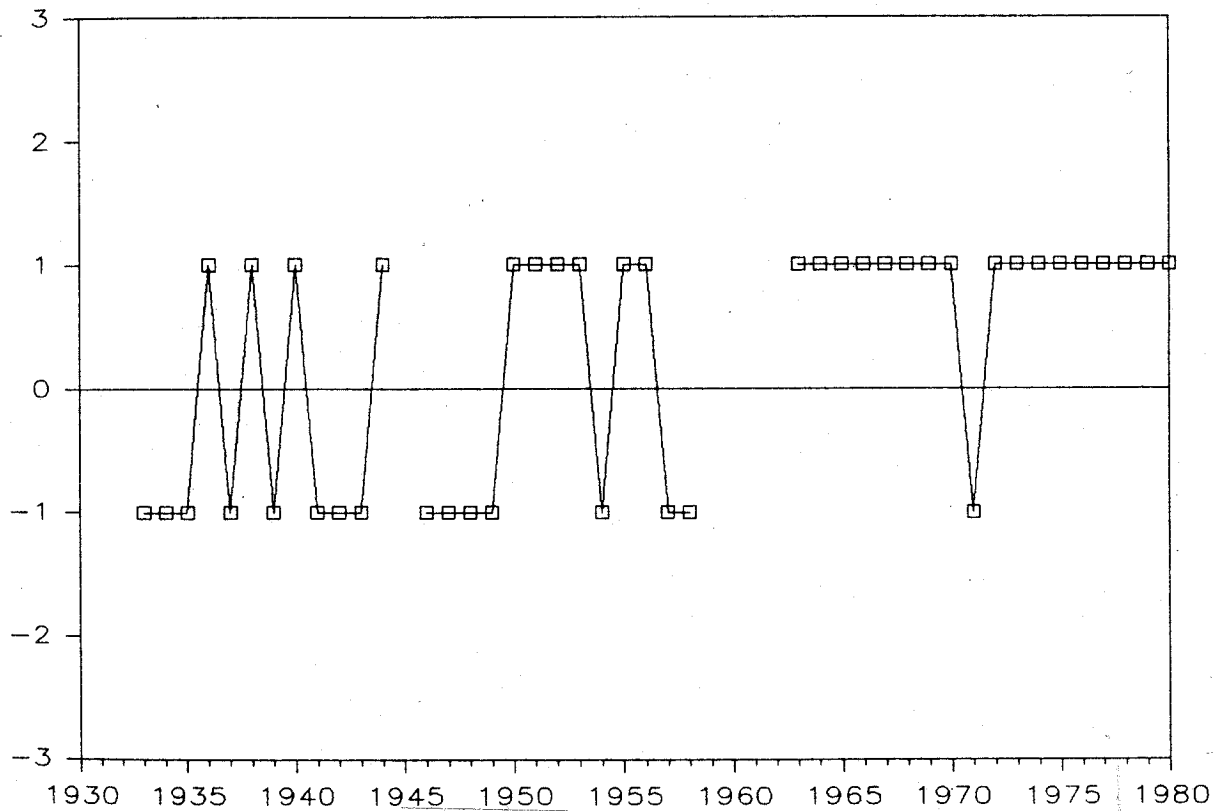
PRÍKLAD 1.4 (All Star Baseball Games, 1933–1980).

$$x_t = \begin{cases} 1 & \text{if the National League won in year } t, \\ -1 & \text{if the American League won in year } t. \end{cases}$$

$t - 1900$	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
x_t	-1	-1	-1	1	-1	1	-1	1	-1	-1	-1	1	†	-1	-1	-1
$t - 1900$	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
x_t	-1	1	1	1	1	-1	1	1	-1	-1	*	*	*	*	1	1
$t - 1900$	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
x_t	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	1

† = no game.

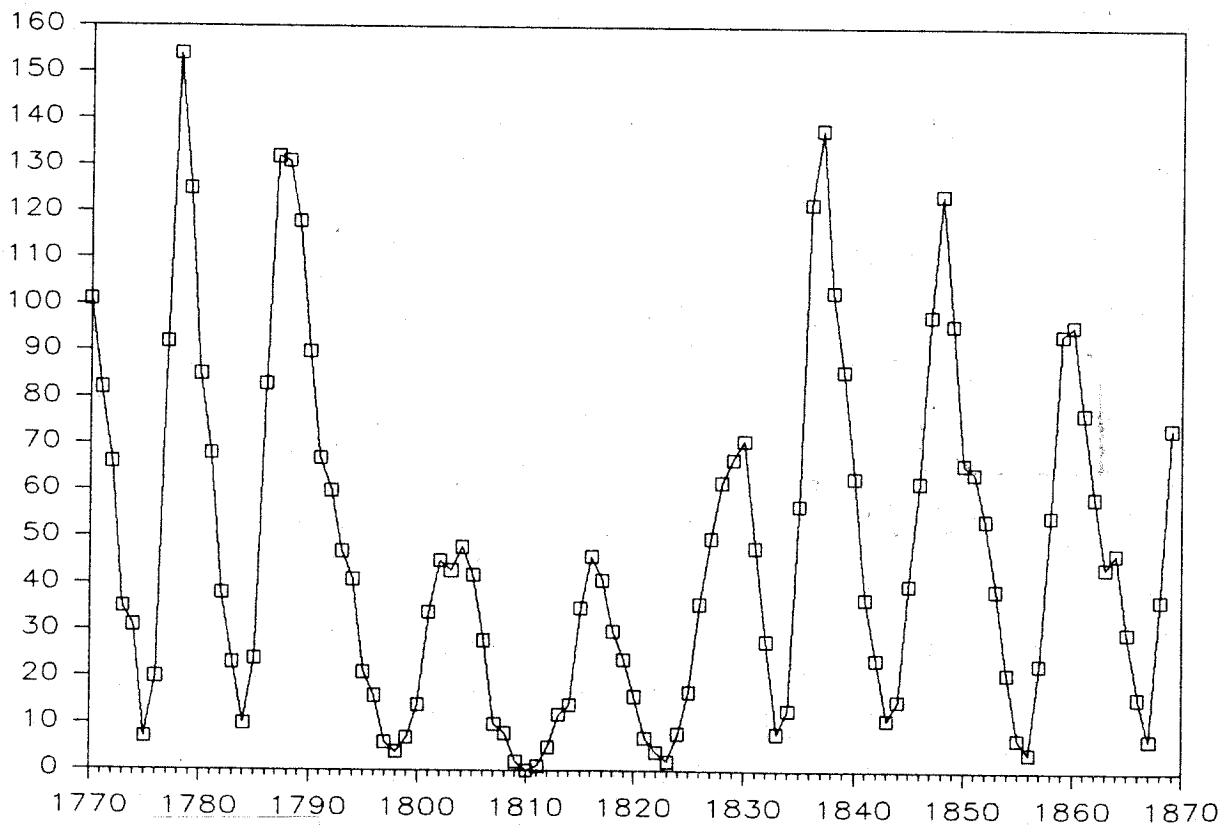
* = two games scheduled.



OBRA 1.4. Results x_t , Example 1.1.4, of All-star baseball games, 1933–1980.

BEISPIEL 1.5 (Wölfer Sunspot Numbers, 1770–1869).

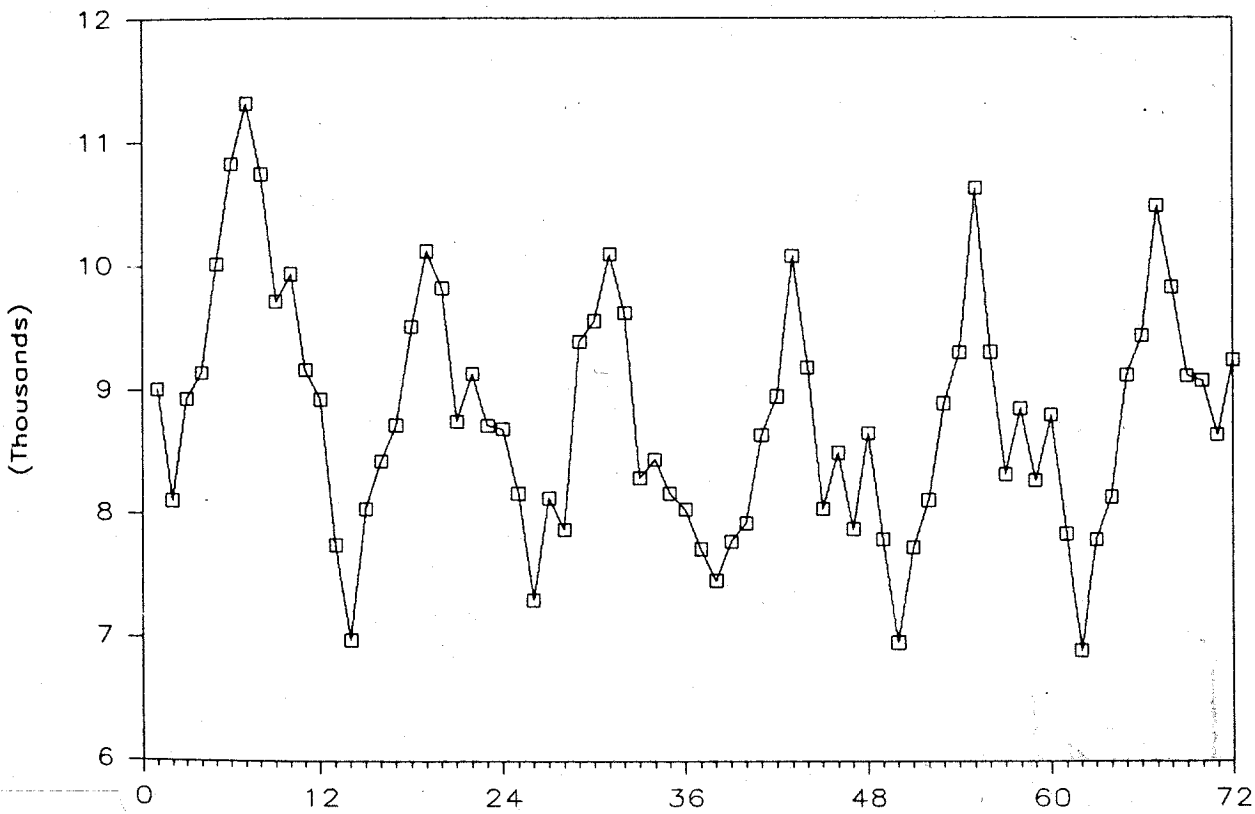
1770	101	1790	90	1810	0	1830	71	1850	66
1771	82	1791	67	1811	1	1831	48	1851	64
1772	66	1792	60	1812	5	1832	28	1852	54
1773	35	1793	47	1813	12	1833	8	1853	39
1774	31	1794	41	1814	14	1834	13	1854	21
1775	7	1795	21	1815	35	1835	57	1855	7
1776	20	1796	16	1816	46	1836	122	1856	4
1777	92	1797	6	1817	41	1837	138	1857	23
1778	154	1798	4	1818	30	1838	103	1858	55
1779	125	1799	7	1819	24	1839	86	1859	94
1780	85	1800	14	1820	16	1840	63	1860	96
1781	68	1801	34	1821	7	1841	37	1861	77
1782	38	1802	45	1822	4	1842	24	1862	59
1783	23	1803	43	1823	2	1843	11	1863	44
1784	10	1804	48	1824	8	1844	15	1864	47
1785	24	1805	42	1825	17	1845	40	1865	30
1786	83	1806	28	1826	36	1846	62	1866	16
1787	132	1807	10	1827	50	1847	98	1867	7
1788	131	1808	8	1828	62	1848	124	1868	37
1789	118	1809	2	1829	67	1849	96	1869	74



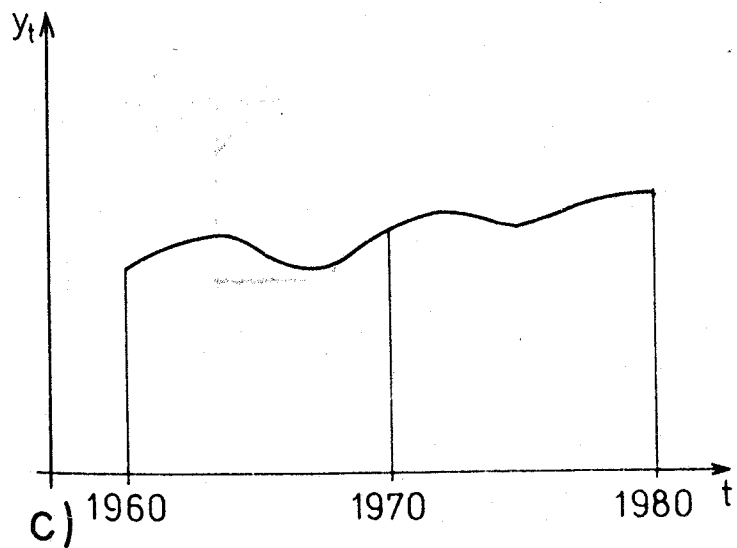
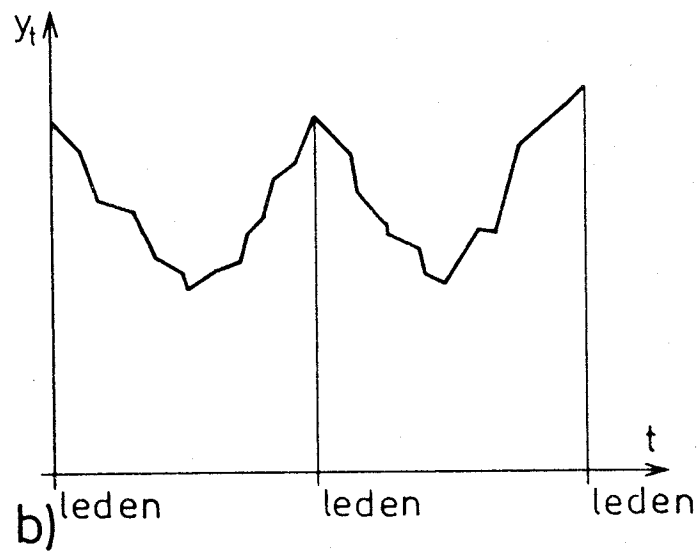
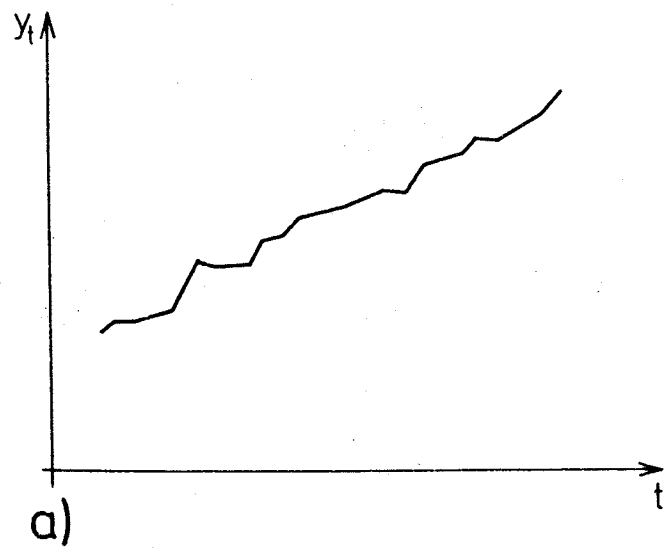
BEISPIEL 1.5. The Wölfer sunspot numbers, 1770–1869.

~~PRIKLAD~~ 1.6 (Monthly Accidental Deaths in the U.S.A., 1973–1978).

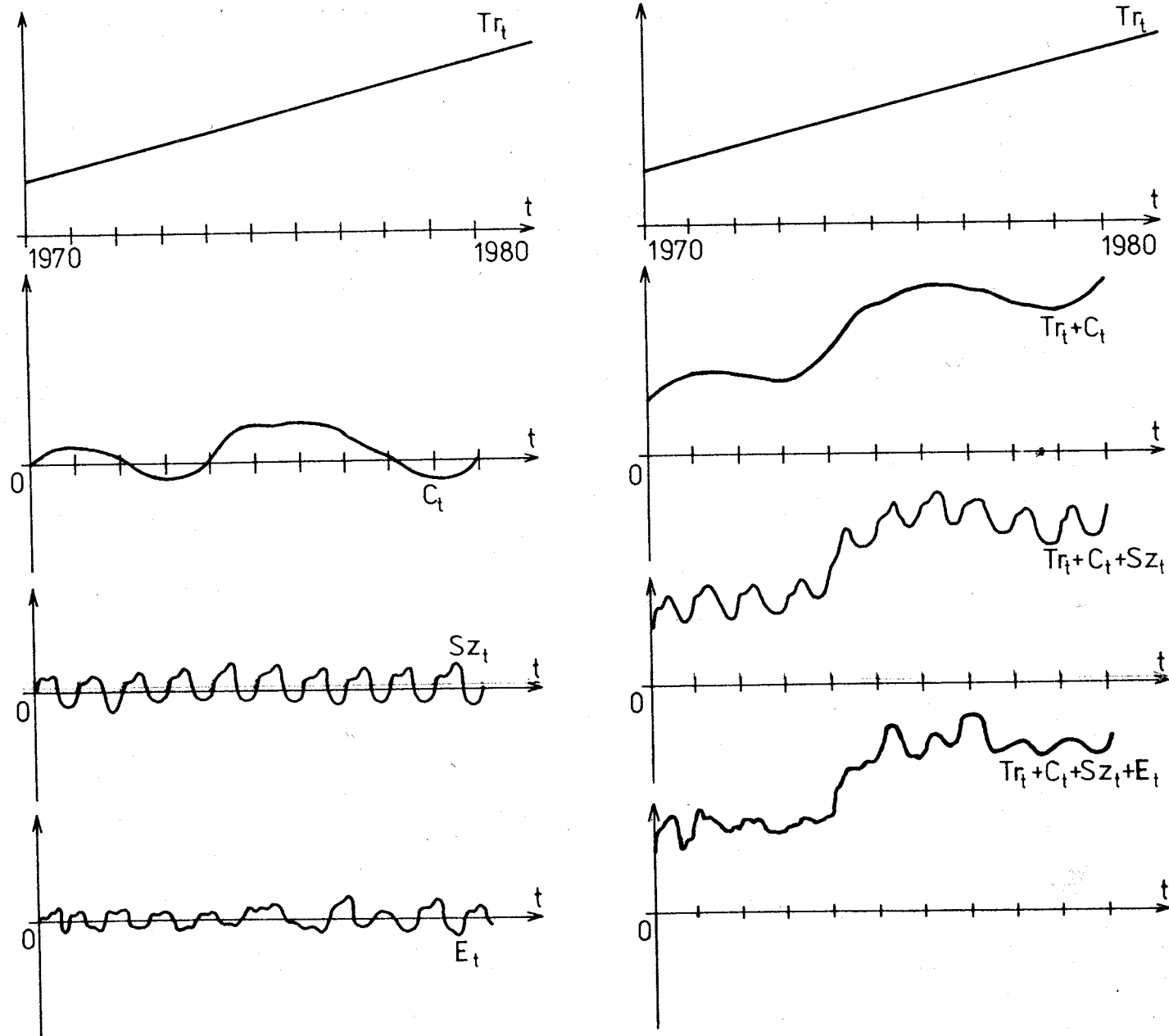
	1973	1974	1975	1976	1977	1978
Jan.	9007	7750	8162	7717	7792	7836
Feb.	8106	6981	7306	7461	6957	6892
Mar.	8928	8038	8124	7776	7726	7791
Apr.	9137	8422	7870	7925	8106	8129
May	10017	8714	9387	8634	8890	9115
Jun.	10826	9512	9556	8945	9299	9434
Jul.	11317	10120	10093	10078	10625	10484
Aug.	10744	9823	9620	9179	9302	9827
Sep.	9713	8743	8285	8037	8314	9110
Oct.	9938	9129	8433	8488	8850	9070
Nov.	9161	8710	8160	7874	8265	8633
Dec.	8927	8680	8034	8647	8796	9240



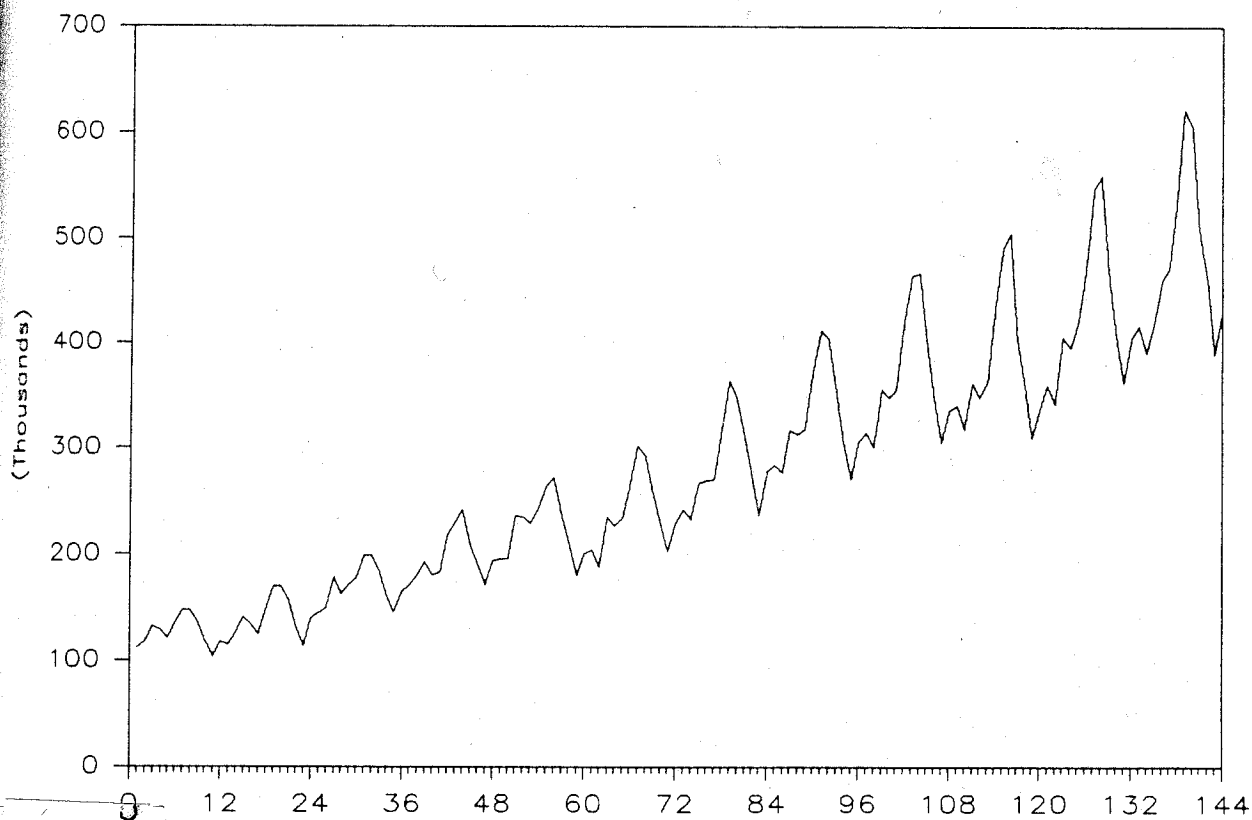
~~PR~~ 1.6. Monthly accidental deaths in the U.S.A., 1973–1978 (National Safety Council).



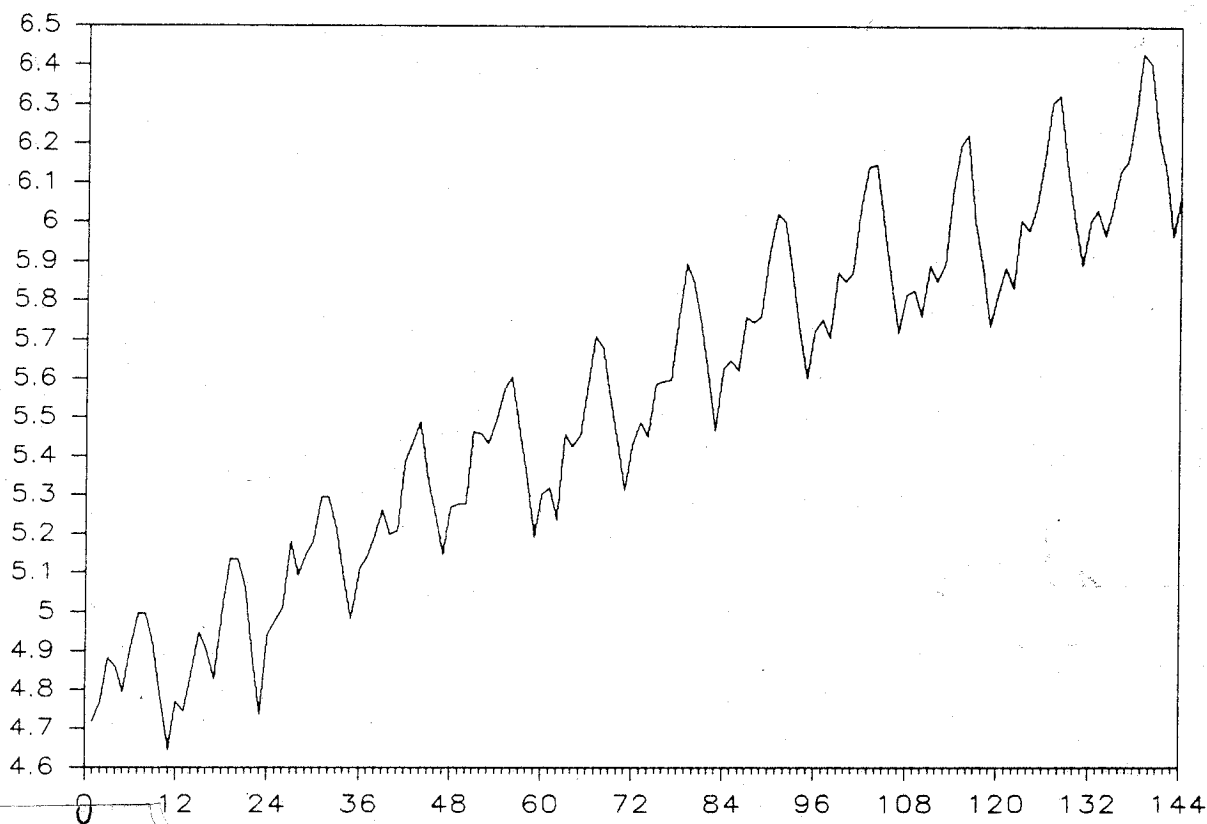
OBR. 17 Časová řada vykazující výraznou
 a) trendovou, b) sezónní, c) cyklickou složku



Obr. 18 Aditivní dekompozice časové řady



International airline passengers; monthly totals in thousands of passengers $\{U_t, t = 1, \dots, 144\}$ from January 1949 to December 1960 (Box and Jenkins (1970)).



Natural logarithms, $V_t = \ln U_t, t = 1, \dots, 144$, of the data in Figure 9.7.

Obz. 1.9