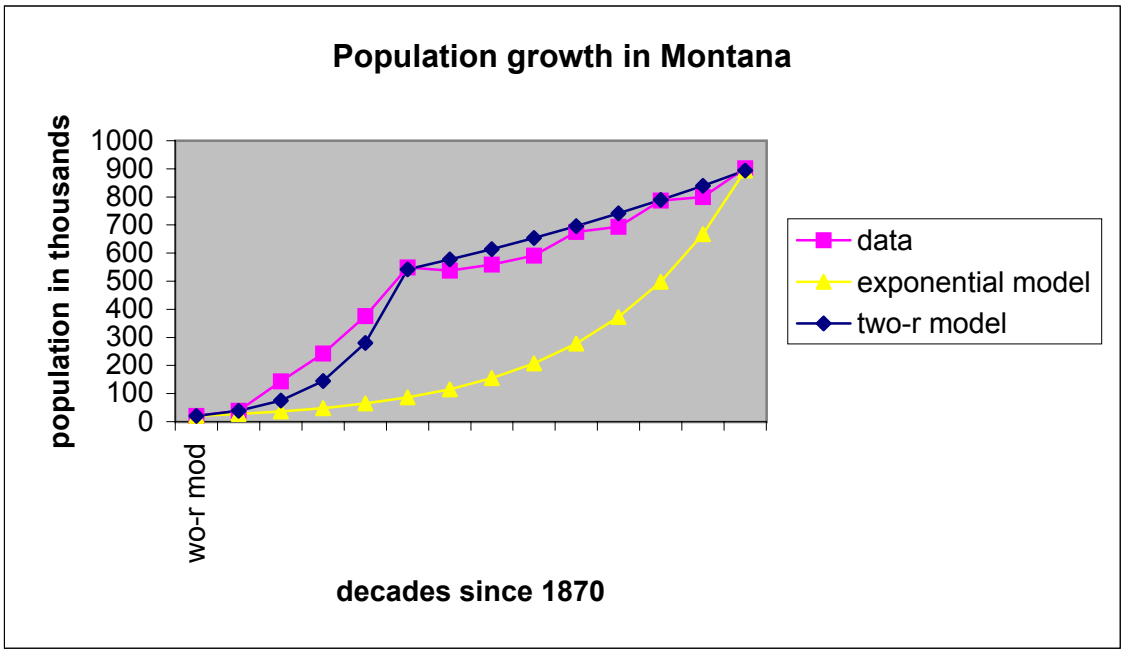
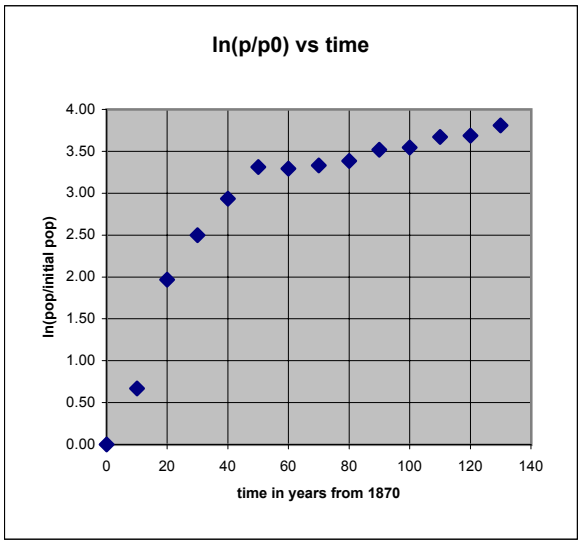
DiffEq Lab 1.4 p.142 - EJZ Oct 2002

Modeling population growth in Montana
Exponential growth models:

					r	0.029		0.0660	0.0063	
		data: P=			**predictions**		fast	slow	**two-r model**	
year	t	pop/1000	P/P0	ln(P/P0)		P(t)	t-50	P(0-50)	P(50-130)	
1870	0	20	1.00	0.00		20		20		20
1880	10	39	1.95	0.67		27		39		39
1890	20	143	7.15	1.97		36		75		75
1900	30	243	12.15	2.50		48		145		145
1910	40	376	18.80	2.93		64		280		280
1920	50	549	27.45	3.31		86	0	542	542	542
1930	60	538	26.90	3.29		116	10		577	577
1940	70	559	27.95	3.33		155	20		614	614
1950	80	591	29.55	3.39		207	30		654	654
1960	90	675	33.75	3.52		278	40		696	696
1970	100	694	34.70	3.55		372	50		741	741
1980	110	787	39.35	3.67		498	60		789	789
1990	120	799	39.95	3.69		667	70		840	840
2000	130	902	45.10	3.81		894	80		894	894



Growth rate=slope of ln/t curve~3.8/130 = 0.029 (1/r = rate



Could get a better fit with two exponential growth periods (the "two-r model" above):

(a) fast growth for the first 50 years at a rate of 3.3/50=	0.0660	ra (1/years)
(b) slow growth for the next 80 years at rate (3.8-3.3)/(130-50)=	0.0063	rb (1/years)

Then P(0-50) = P0 e^(ra t) peaks at P(50), and
P(50-130) = P(50 e^(rb t)