

Math 3CI: Project 2

Population growth

October 2, 2009

The following populations and yearly growth rates come from Wikipedia and www.indexmundi.com:

Country	Population in 2009	Yearly growth rate	Rate constant k
Uganda	32,700,000	3.6%	.0354
Somalia	9,130,000	2.82%	xxxx
Iraq	30,700,000	2.56%	.0253
Haiti	10,000,000	2.49%	.0246
Egypt	77,000,000	1.68%	.0167
India	1,170,000,000	1.58%	.0157
USA	308,000,000	.88%	.0088
China	1,333,000,000	.63%	.0063
UK	61,600,000	.28%	.0028
Japan	128,000,000	.14%	.0014
Germany	82,000,000	.04%	.0004

The rate constant measure the **instantaneous** rate of growth needed to produce a given percentage growth rate in one year.

You are working for the United Nations and trying to understand the effects of current population trends. You decide to model population growth using the following assumptions: First there is no immigration or emigration from any country. Second instantaneous birth and death rates are constant. Formulate a differential equation which models population (as a function of time) under these assumptions. Can you solve this differential equation?

Using the data given, can you determine when the population of India will overtake the population of China (assuming growth rates remain constant)? What is the rate constant for Somalia?