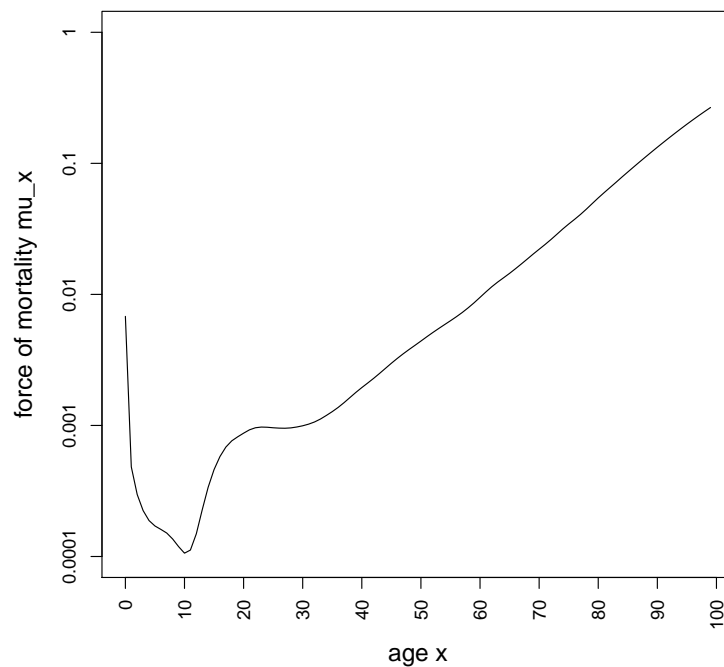


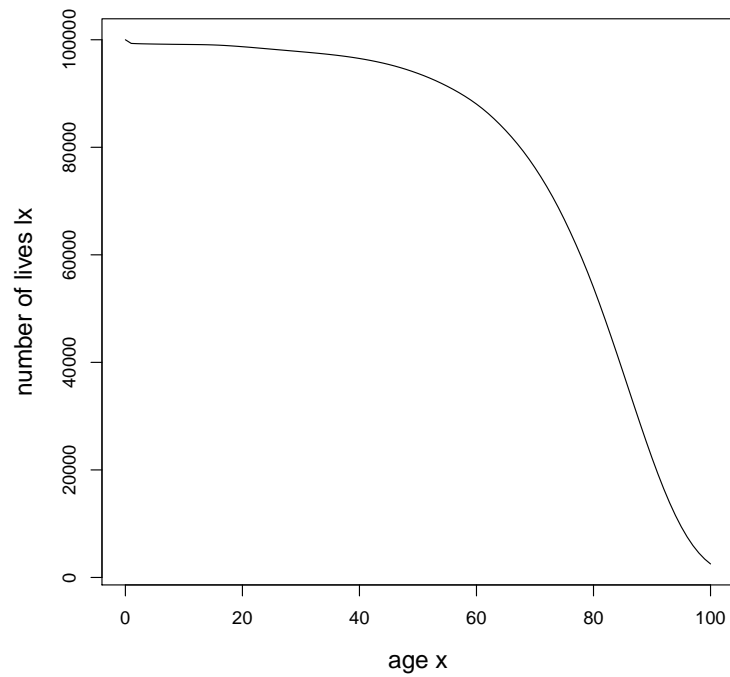
Exercise 3.1

The figures below are based on the US Life Table, 2004 prepared by the Center for Disease Control and Prevention (CDC). The table typifies pattern of human population mortality.

- (a) The table does not give values of μ_x , but assuming UDD (or even constant force) between integral ages, we find that $\mu_x \approx q_x$. Major features observed here are the large force of mortality at birth, decreasing for about the next 10 years, and non-decreasing after that. We also often observe a constant force between ages 20 to about 40, and then rapidly increasing beyond age 40. Although this may be a general trend, the age period of decrease and then growth may vary from population to population.



- (b) Because humans die over time, the general trend for ℓ_x is that it is decreasing with age x , as we observe with the figure below. Fewer people die within the first few years and then the graph start to sharply decrease at a particular period, in this case, at about age 40. This is consistent with observing the sharp rise in the force of mortality at that age.



- (c) The main features we usually observe with the number of deaths are the large number often observed in the first year of birth, a flatness over a certain period, and a sharp rise beyond that. However, in later ages, as the number of lives diminishes, the number of deaths sharply decreases. However in this period, the rate of mortality is still sharply rising.

