

# Graunt, Halley, and US 1993 Life Table with ggplot

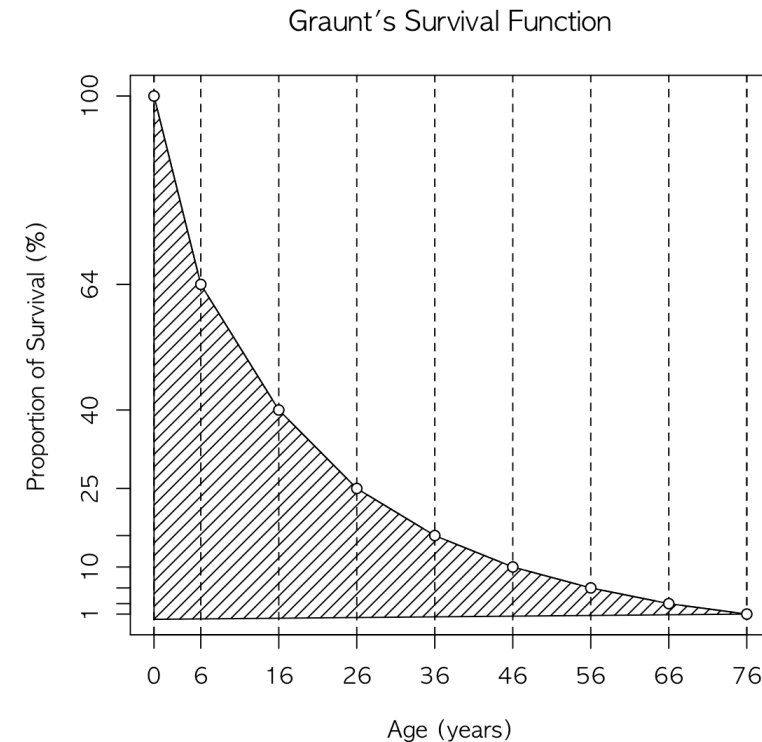
coop711

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## Source of Data

| Age | Graunt | 1993 |
|-----|--------|------|
| 0   | 100    | 100  |
| 6   | 64     | 99   |
| 16  | 40     | 99   |
| 26  | 25     | 98   |
| 36  | 16     | 97   |
| 46  | 10     | 95   |
| 56  | 6      | 92   |
| 66  | 3      | 84   |
| 76  | 1      | 70   |

## Graunt's Life Table

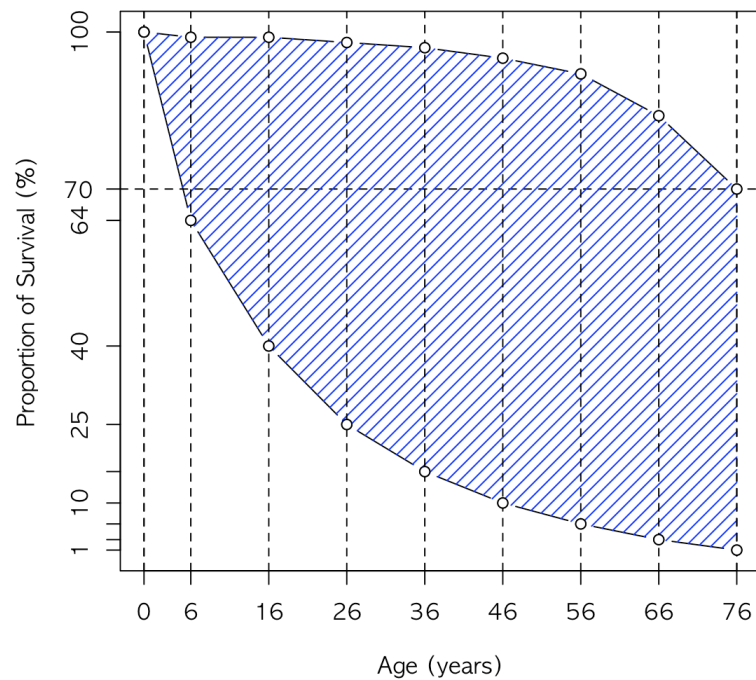


The area under the curve can be approximated by the sum of the areas of trapezoids, therefore the area is  $\sum_{i=1}^{n-1} (x_{i+1} - x_i) \times \frac{1}{2}(y_i + y_{i+1})$ . Therefore, the life expectancy of Graunt's life table is 18.17(years).

## Comparison with US 1993 life table

The shaded area between the survival function of Graunt and that of US 1993 represents the difference of life expectancies.

Survival Function of Graunt and US 1993



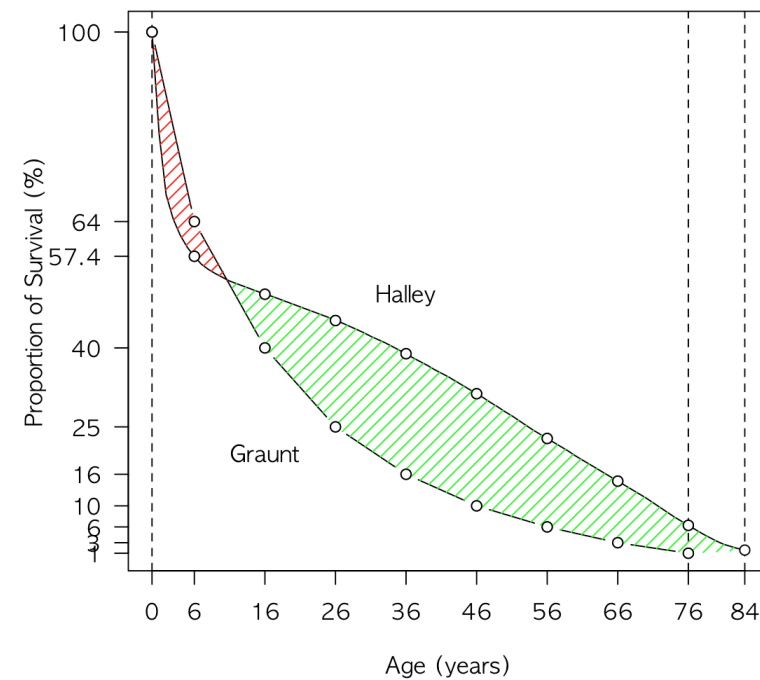
The area under the US 1993 survival function is 70.92, so, the area of shaded region, that is the difference of life expectancy, is 52.75 (years).

## Comparison with Halley's life table

| age | lx   | xPo   | age | lx | xPo |
|-----|------|-------|-----|----|-----|
| 0   | 1238 | 100.0 | 79  | 50 | 4.0 |
| 1   | 1000 | 80.8  | 80  | 41 | 3.3 |
| 2   | 855  | 69.1  | 81  | 34 | 2.7 |
| 3   | 798  | 64.5  | 82  | 28 | 2.3 |
| 4   | 760  | 61.4  | 83  | 23 | 1.9 |
| 5   | 732  | 59.1  | 84  | 20 | 1.6 |

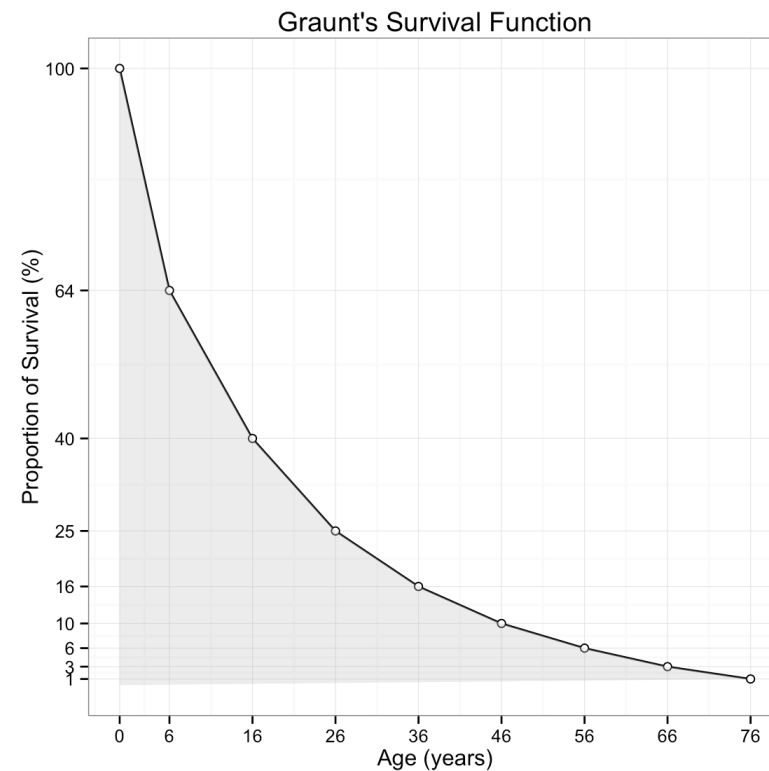
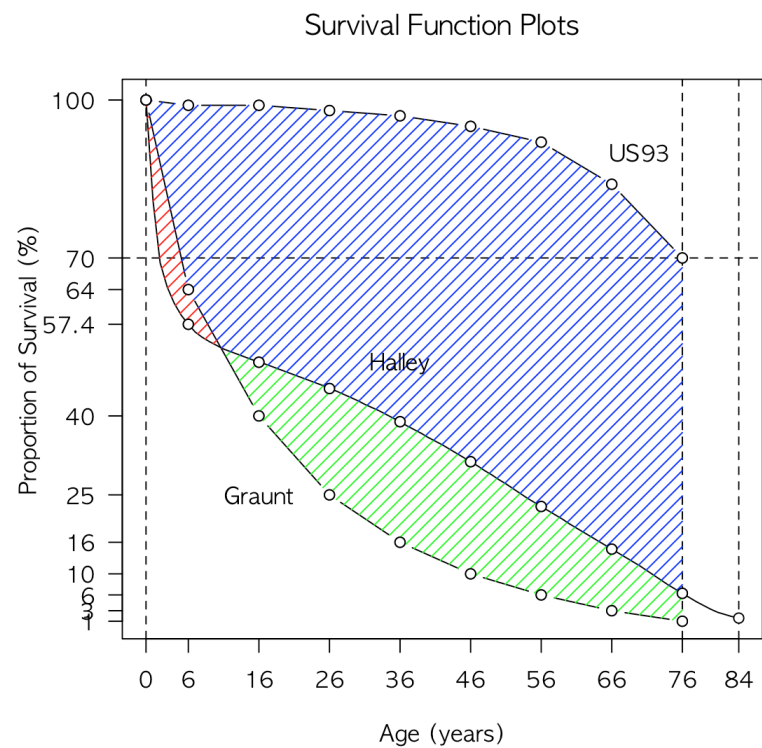
## R base graphics

Survival Function of Graunt and Halley



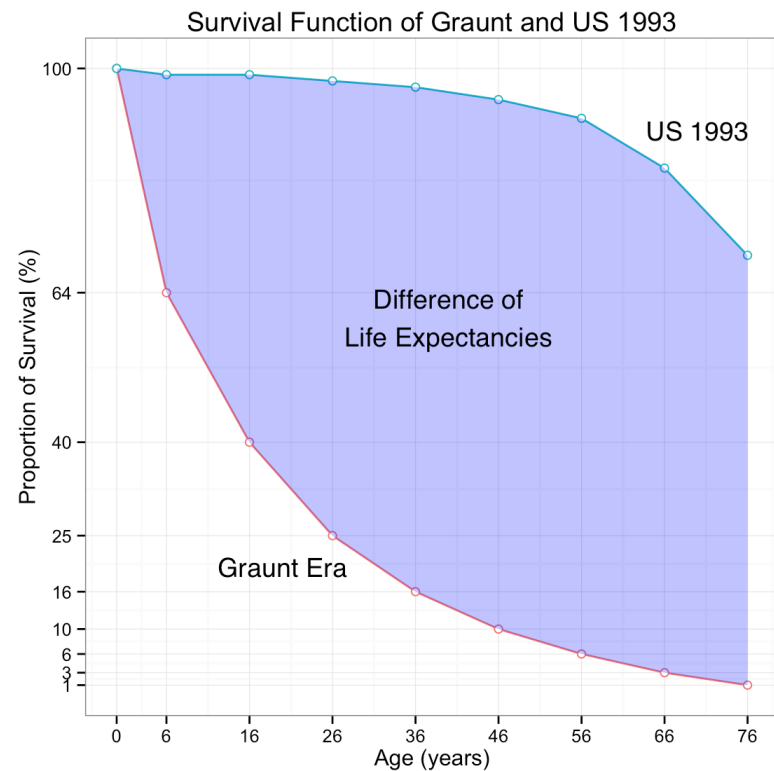
Compute the difference of life expectancies, Halley's is 27.872 (years), and Graunt's is 18.17 (years).

## Graunt, Halley, and US 1993

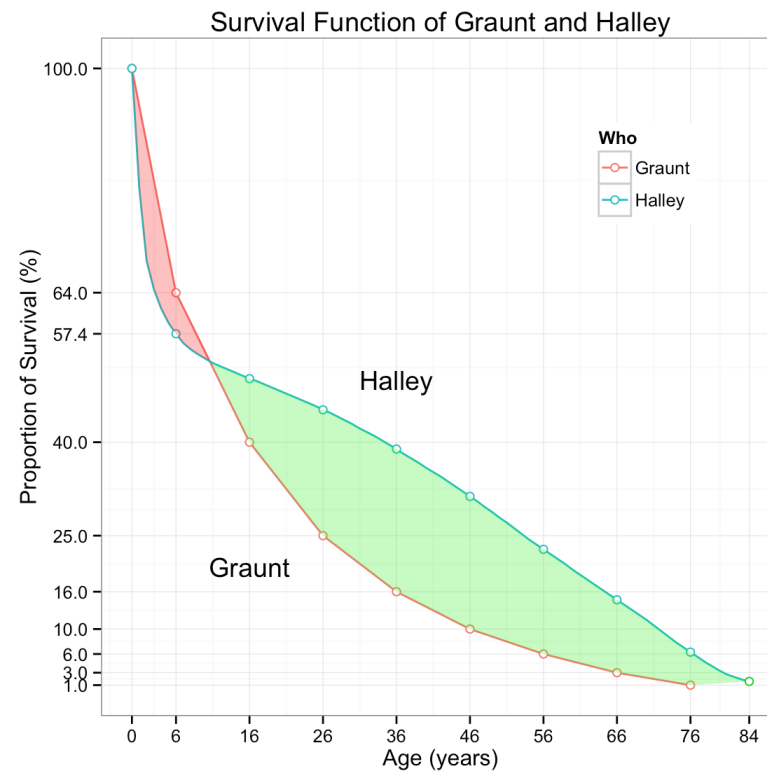


ggplot  
Graunt

Graunt and US 1993



Graunt and Halley



Graunt, Halley, and US93

Survival Function Plots

