

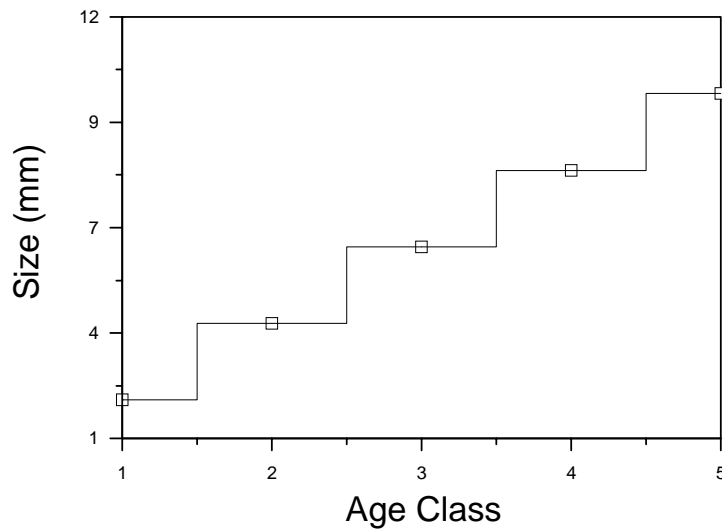
Ecology lab #4 Life tables

1] A static life table.

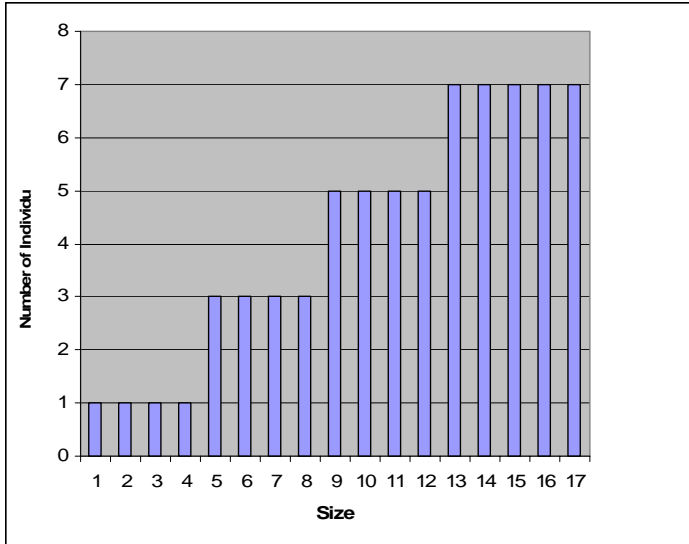
We will use a sample of terrestrial isopods, “sow-bugs”, collected from a compost heap.

Like other arthropods, these animals do not show continuous growth but grow in a series of molts. Thus, different ages can be identified by discrete size distributions.

Size class versus age for hypothetical arthropods



Your (real) data will not be this “clean” – however, if you put the raw measurements into Excel, sort into ascending order, and plot a “column chart”, you should be able to determine a sensible set of age/size classes.



For simplicity, assume the sow bugs have a 50:50 sex ratio, which avoids the hassle of having to sex every individual. Count the number of individuals in each size (age) class.

Complete table 1.

Age Class	Number surviving at beginning of age class, n_x	Number surviving as a fraction of newborn, l_x	Number dying during age interval, d_x	T_x	E_x
1					
2					
3					
4					
5					
6					

Calculate T_x , the total time to be lived by all individuals of age x . (example $T_2 = L_2 + L_3 + L_4 + L_5 + L_6$)

Calculate the age specific life expectancy, E_x , where $E_x = T_x / N_x$

E_1 = the expected life span of an individual at birth.

Plot a survivorship curve (Log10 of L_x against age class). Is it type I, II, or III ?

In our example, time is in growth stages and we do not know the length of time between molts. If (for the sake of argument) we set the time between molts as 1 month, **what is the average life expectancy of your isopods?**

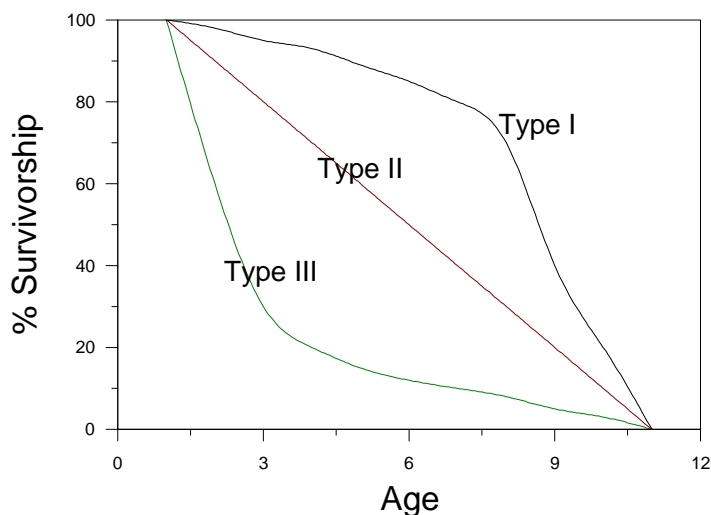
2] A Cohort Life Table

A common source of cohort data for humans is graveyard tombstones, which typically carry information on birthdate, death date, and sex. A number of data sets are available for graveyards, usually located in New England.

Procedure.

- 1] Download and open the Excel data file, 'Cemeterydata.xls'.
- 2] Sort the data by sex.
- 3] Create a new column, and fill it with 'age at death'.
- 4] Select a cohort of your choice (for the sake of this exercise, we will define a cohort as those individuals born within a specified decade). Choose a cohort no later than about 1915 (**why?**).
- 5] For the chosen cohort, sum the number of deaths in each age class (eg. 0-9 years old, 10-19 years old, etc). This is column d_x . The sum of this column should equal the total deaths for the chosen decade.
- 6] Your third column is Survivorship, l_x . Place a zero in the bottom cell. The value for any other cell, l_x , is cumulative from the d_x column. (see example).
- 7] Standardize Survivorship to 'per 1000 individuals' by
standardized survivorship = total tombstones in cohort decade \times 1000
- 8] Calculate the standardized survivorship values as log (base 10). [last value is 0, and log10 of zero will not calculate, so use 0]
- 9] **Plot Log Survivorship against time** (time on x axis) to produce a Survivorship curve. **Is it Type I, II or III?**

Hypothetical Survivorship Curves



10] Repeat for males. **Do the curves differ?**

11] Calculate a new column, T_x ,

12] Compute a new column, E_x , where $E_x = T_x/N_x$, (N_x the number of individuals alive at the beginning of that interval). E_x is the mean life expectancy at each interval.

What are the life expectancies of a male and female born in your chosen decade?

Write-ups – keep them brief, address the issues in bold, underlined typeface. Due next week.