Introduction to Demographic Methods

Session 7 Exercise

1. The following values are taken from a life table:

\[
\begin{align*}
q_{85} &= 0.1256 \\
q_{86} &= 0.1375 \\
q_{87} &= 0.1498 \\
q_{88} &= 0.1616 \\
q_{89} &= 0.1729 \\
\end{align*}
\]

Check the correct probability of surviving to exact age 90:

\[
\begin{align*}
0.24 & \quad 0.34 & \quad 0.44 \\
\end{align*}
\]

Check the correct probability of dying before reaching exact age 90 for those who survive to exact age 85:

\[
\begin{align*}
0.46 & \quad 0.56 & \quad 0.66 \\
\end{align*}
\]

2. From a life table the following figures have been taken:

\[
\begin{align*}
e_{20} &= 45.20 \text{ years} & l_{20} &= 91,940 \\
e_{25} &= 40.52 \text{ years} & l_{25} &= 91,232 \\
\end{align*}
\]

How many people are in age group 20-25?

\[
\begin{align*}
351 & \quad 201,327 & \quad 458,967 \\
\end{align*}
\]

How many people die in the age interval?

\[
\begin{align*}
708 & \quad 808 & \quad 1008 \\
\end{align*}
\]

Is the distribution of death \( f(x) \) increasing or decreasing in this age interval?

Increasing       Decreasing

3. Check the correct answer:

In a stationary population 87% of those born reach age 20 and 85% reach age 25. If the percentage of people in the age group 20-25 is 7% what is the expectation of life at birth for this population? (assume that deaths occur uniformly in this interval)

\[
\begin{align*}
41 & \quad 55 & \quad 61 \\
\end{align*}
\]

4. Fill in the blanks to complete the following life table for United States 1959-61:

<table>
<thead>
<tr>
<th>Age Interval (exact ages)</th>
<th>nqx</th>
<th>lx</th>
<th>ndx</th>
<th>nLx</th>
<th>Tx</th>
<th>e^x</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>0.02593</td>
<td>100,000</td>
<td>2,593</td>
<td>97,815</td>
<td>6,989,030</td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>0.00420</td>
<td>97,407</td>
<td>409</td>
<td>388,649</td>
<td>70.75</td>
<td></td>
</tr>
<tr>
<td>5-10</td>
<td>0.00420</td>
<td>96,998</td>
<td>233</td>
<td>484,361</td>
<td>6,502,566</td>
<td>67.04</td>
</tr>
<tr>
<td>10-15</td>
<td>0.00221</td>
<td>96,765</td>
<td>214</td>
<td>6,018,205</td>
<td>62.19</td>
<td></td>
</tr>
<tr>
<td>15-20</td>
<td>0.00456</td>
<td>440</td>
<td>481,746</td>
<td>5,534,863</td>
<td>57.33</td>
<td></td>
</tr>
</tbody>
</table>
Check the correct answer for the following (assume that both sexes follow mortality of this common life table):

a) The probability that a woman just entering her childbearing years (age 15) will die before the end of her reproductive life (age 50)?
   0.06 0.07 0.08

b) The probability that a newborn child will die during the childbearing years?
   0.06 0.07 0.08

c) What will be the average age at death of persons of exact age 50 who will die between ages 50 and 75?
   65.1 65.3 65.5

5. Which of the following are true [T] and which are false [F]?

<table>
<thead>
<tr>
<th></th>
<th>T</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A journalist writing a series on Health in the White House noted that the average age of natural death of presidents of the U.S. was higher than that of the average population. From this he concluded that mortality in the U.S. presidents was lower that that of the average U.S. citizen. Is his conclusion true?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If one used the life table stationary population as a standard for a nation, the adjusted and crude death rates would be identical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The actuarial method of life table construction assumes deaths are constant throughout the age interval</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The expectation of life declines uniformly from age 0 onward</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One can reconstruct an entire abridged life table if you are given the ex function</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Introduction to Demographic Methods

Session 7 Answers

1.

0.44
0.56

2.

458 967
708
Increasing

3. 61

4.

\( nQ_x: 0.00240; 0.00802; 0.14463 \)
\( l_x: 96 551; 91 378; 48 170 \)
\( nD_x: 612; 4 045; 15 034 \)
\( nL_x: 483 342; 468 200; 273 484 \)
\( T_x: 6 891 215; 5 053 117; 1 810 550 \)
\( e^o_x: 69.89; 33.92; 17.71 \)

a) 0.08
b) 0.08
c) 65.3

5. T, F, T, F, F