HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES (HUIPS)

DEM 601 Introduction to Demographic Analysis

Exercise Set 4

TERM	SET IN	WORTH	DUE
Fall 2026	lecture 4	2% of the final grade	20 October 2026, 23:59

Readings for this lecture

Rowland, Donald T. (2003) *Demographic Methods and Concepts*
Age-Sex Composition

Hinde, Andrew (1998) *Demographic Methods*
Models of Population Structure

Newell, Colin (1988) *Methods and Models in Demography*
Age and Sex Structure

Wachter, Kenneth W. (2014) *Essential Demographic Methods*
Stable Age Structures

Carmichael, Gordon A. (2016) *Fundamentals of Demographic Analysis: Concepts, Measures and Methods*
Basic Sources, Concepts, Definitions and Types of Measures

How to hand this in. By 20 October 2026, 23:59. Show your working: an answer with no arithmetic behind it earns no marks even when the number is right. **A sex ratio and a dependency ratio are ratios, not percentages**, so say what is divided by what and give the units every time. Quote ratios to one decimal place and proportions to two, and never round in the middle of a calculation. Late work receives no credit.

Every table on this sheet is also a CSV in the `data/exercise04` zip file handed out with it, so no figure needs typing in by hand.

The population of Atlantis

Questions 1 and 2 are both about this table.

Age group	Males	Females	Age group	Males	Females
0-4	3,052,255	2,902,489	50-54	980,115	1,038,853
5-9	3,541,409	3,357,800	55-59	993,402	947,119
10-14	3,560,900	3,330,499	60-64	768,547	846,746
15-19	3,165,061	3,051,408	65-69	471,479	521,608
20-24	2,581,153	2,514,351	70-74	242,572	303,519
25-29	2,435,765	2,377,362	75-79	204,665	236,259
30-34	2,096,899	1,989,410	80-84	105,386	156,938
35-39	1,784,121	1,705,943	85+	67,040	107,897
40-44	1,481,784	1,369,640	Unknown	26,381	18,101
45-49	1,111,113	1,090,046			

Atlantis, 1990 Census. The last row is the people the enumerator counted but whose age was never recorded.

1. The ages nobody wrote down

20 marks

a. What proportion of the population had no age recorded? Give it for males, for females, and for both sexes together.

b. Distribute the unknowns **pro rata, separately for each sex**. Give each sex's factor to six decimal places, and the adjusted counts for the youngest and the oldest age group.

c. Pro rata spreads the unknowns over the ages in the same proportions as the recorded ages. What must be true of the people with a missing age for that to be correct? Give one group of people whose age is more often missing, and say why pro rata would put them in the wrong ages.

> **Report the factor first.** The factor is the total divided by the known. It is always above one, and how far above one shows how much of the table you are filling in.

2. Atlantis, men per hundred women

22 marks

Use the Atlantis table throughout.

a. Compute the sex ratio of the whole population **three ways**: from the known ages only; from the counted totals, unknowns included; and from your redistributed table in 1(b). Two of the three are equal. Say which two, and explain in one line why.

b. Compute the sex ratio for every age group, as one column beside the age groups.

c. From that column, name three age groups: where the ratio first falls below 100, where it rises above 100 again, and from where it stays below 100. Mortality can only push the ratio down. Name two things that can push it up, and say which one you think explains Atlantis, and why.

3. Two ages for the same person

16 marks

Four people, one date. Compute both ages for each of them **on 22 October 2026**, the day this sheet is due.

Person	Date of birth	Completed age	Exact age
A	14 March 1994		
B	29 October 2001		
C	29 February 2000		
D	6 January 2026		

a. Fill in both columns: completed age as a whole number, exact age to two decimal places.

b. For one person, subtracting the year of birth from the current year gives the wrong completed age. Who is it? What does the subtraction give, and what is the correct completed age?

c. Person C was born on 29 February. Which date did you use as their birthday in a year with no 29 February? Why is that a convention and not a fact?

d. A published age table holds only one of your two columns. Which one? What does someone who needs the other one have to assume?

Türkiye by age and sex

Questions 4 and 5 are both about these two distributions.

Age group	Males 2010	Females 2010	Males 2025	Females 2025
0-4	3,173,092	3,005,631	2,491,429	2,365,131
5-9	3,148,210	2,982,908	3,156,806	2,999,106
10-14	3,369,995	3,198,746	3,344,303	3,173,948
15-19	3,219,221	3,058,086	3,303,829	3,135,824
20-24	3,200,959	3,066,828	3,206,123	3,062,572
25-29	3,275,153	3,162,769	3,372,727	3,247,662
30-34	3,146,214	3,063,753	3,197,919	3,116,930
35-39	2,798,870	2,767,247	3,163,880	3,111,320
40-44	2,344,747	2,249,976	3,235,535	3,196,649
45-49	2,358,913	2,341,378	3,116,569	3,077,564
50-54	1,871,231	1,835,058	2,747,715	2,758,433
55-59	1,614,971	1,649,342	2,265,962	2,234,278
60-64	1,190,577	1,301,377	2,171,547	2,255,348
65-69	848,726	958,566	1,629,718	1,741,051
70-74	633,016	787,768	1,224,255	1,435,020
75-79	502,175	615,872	772,763	1,028,765
80-84	245,975	418,326	402,550	599,348
85-89	83,179	161,183	182,013	323,863
90+	17,958	54,992	73,791	169,922

TurkStat, ABPRS.

4. Türkiye, 2010 against 2025

24 marks

a. For each year, give the percentage of the total population in three age groups: 0-14, 15-64, and 65 and over.

b. For each year, compute the child, elderly and general dependency ratios and the aging index. Put the two years side by side in one table.

c. The general dependency ratio barely changed between the two years. Show that the child and the elderly dependency ratios both changed a lot, in opposite directions. Give each change as the difference between the two years (30.0 to 25.0 is a fall of 5.0), not as a percentage change.

d. In three or four sentences: is the general dependency ratio a good summary of what happened to Türkiye's age structure between these years? Use your answer to (c) as evidence.

5. Two pyramids

18 marks

a. Draw the population pyramid of Türkiye for 2010 and for 2025 from the table above. Make every bar a percentage **of the total population, both sexes together**, and use the **same** horizontal scale for both.

b. Compare the two pyramids. Name three changes in shape. For each, give the demographic process behind it **and the years in which the people in that part of the pyramid were born**.

c. Suppose each sex had instead been drawn as a percentage of its own total. What would that do to the picture? Which measure from question 2 could such a pyramid no longer show?

THE POPULATION BLUEPRINT · CHAPTER 4

Chapter 3 put your population in motion. This chapter opens it up.

1. Obtain your population by sex and five-year age group for the most recent year available. State the source, the year and the reference date, whether ages are single years or grouped, and whether the table has a category for unknown age. If it has one, redistribute it and report the factor. If it has none, say so: the unknowns have then been dropped or already redistributed.
2. Compute the sex ratio for the whole population and for every age group. Say where it crosses one hundred.
3. Compute the three broad shares and all four measures built on them.
4. Score the table for age heaping if your source publishes single years of age, and say plainly that you cannot if it does not. Most sources publish five-year groups, and saying so is the finding, not a failure.
5. Draw the pyramid, on percentages of the total population of both sexes. Then write one paragraph reading it as history: name three features of the shape and the event or trend behind each, each with the years the people in it were born.
6. Compute the index of dissimilarity between your population and Türkiye in the same year, using the register table above. One sentence on what it tells you.

Bring the redistribution factor and the index of dissimilarity to class: they are the two numbers that say how comparable your population is with everyone else's.

Total: 100 marks