



Worksheet 3: Statistics in Desmos

This data comes from the **United Nations** — one of the most trusted sources of global population statistics. It covers North Macedonia across four time points: **2010, 2015, 2020, and 2025**.

You will work with two indicators:

- **Life expectancy at birth** — how many years a person born in that year is expected to live
- **Under-five mortality rate** — how many children out of every 1,000 born alive die before age 5

You will use Desmos to calculate statistics and build charts — the same tools real data scientists use.

Part A — Enter Your Data in Desmos

Open Desmos and create two lists, L and M. Find the data for both life expectancy at birth and under-five mortality rate in the UN data tab in the Excel file of the toolbox. The data correspond to the years 2010, 2015, 2020, and 2025.

1. Before calculating anything, just look at list L. Do the numbers go consistently up, or is there something unexpected?

2. What do you notice about list M? Is the trend what you would expect for a country developing over time?



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Part B – Mean and Median

In Desmos, type each of these formulas one by one and write down the results:

For life expectancy (list L):

`mean(L)` → Result: _____

`median(L)` → Result: _____

For under-five mortality (list M):

`mean(M)` → Result: _____

`median(M)` → Result: _____

Now answer:

1. For life expectancy, is the mean higher or lower than the median? What does this tell you about the data?

2. The mean and median are both ways of finding the "middle" of data. When would the median be more useful than the mean? Discuss with your group:

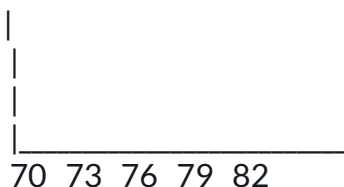


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Part C — Build a Histogram

Now add a third list, G, life expectancy split by **male and female** across all four years. This gives you 8 values to work with. Make the Histogram in Desmos.

1. Sketch the rough shape of the histogram in the box below (just the outline — how many bars, where are they tallest?):



2. What range of values appears most frequently in the histogram?

Between ____ and ____ years.

3. Do the values cluster tightly together or are they spread out widely? What does this tell you about life expectancy in North Macedonia?

4. A histogram works well here. Can you think of a situation where a histogram would NOT be the right chart to use?



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Part D – Build a Box Plot

A box plot shows you the spread of data differently from a histogram – it highlights the minimum, maximum, median, and the middle 50% of values. Make the box plot in Desmos.

Now answer:

1. Write down what Desmos shows you for each of these:

Minimum value: _____ Maximum value: _____ Median: _____ Q1 (lower quartile): _____ Q3 (upper quartile): _____

2. The "box" in the middle represents 50% of your data. How wide is the box (Q3 minus Q1)?

$Q3 - Q1 = \underline{\hspace{2cm}}$ years. This is called the **interquartile range (IQR)**.

3. Now create a second box plot using only the male values and only the female values:

What is the most obvious difference between the two box plots?

4. Do the two boxes overlap at all? What would it mean if they did not overlap at all?



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Part E — Connect to Reality

1. Life expectancy in North Macedonia dropped in 2020 compared to 2015. What major global event happened in 2020 that could explain this?

2. Women consistently live longer than men in this data. Is this unique to North Macedonia, or is it a global pattern? Why do you think this might be?

3. The 2025 data is marked as a "projected estimate." Should we treat projected data the same way as measured data? Why or why not?
