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| Photo displaying partial image of two pie charts on a canvas-textured page |
| Assignment 1 - Data Visualization  Steven Laurie Due Date: 03/10/2023 |
| |  |  |  | | --- | --- | --- | | Steven Laurie |  | Data Visualization | |

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# **First Task**

## Policies and Procedures

When working with data there are different types of policies and procedures, we must adhere by to create a safe and protected work environment for all stakeholders involved in the business. In terms of data protection, there are a few different laws put in place to protect the unlawful use of information. In the United Kingdom all organisations must follow the General Data Protection Regulation 2018 (UK GDPR) and the Data Protection Act 2018 (DPA). The General Data Protection Regulation also applies to the EU however when the UK separated form the European Union a new version specific to the UK was bought into legislation.

DPA refers to how your personal information is used by different organisations, businesses or forms of government. Where GDPR is an updated version of the DPA which applies to many more companies while also protecting more data. One difference between the two is that when there is a Data Breach and information is lost, DPA does not require businesses to report the breach, but GDPR does.

A lot of organisations implement something known as a Data governance policy which defines how it will use and manage the data it holds. This policy is usually kept in the form of a document and will provide an overview of all the different roles and their responsibilities when processing data related to the company. Typically, it will cover the following:

* Data Quality/Integrity – How often the data is updated and cleansed?
* Data Access – Does all parties have access to the information they need and no excess?
* Data Usage – Are correct data ethics in use, how is misuse punished?
* Data Integration – Do all roles have access to the **same** accurate information?
* Data Security – How is data kept secure and protected?

Failure to follow this policy can lead to the breaching of the GDPR or DPA laws set in place. The punishments for these can get very harsh. In the UK the GDPR and DPA has a maximum set fine of £17.5 million or 4% of the organisation’s annual global turnover, Whichever one is larger.

It is important to abide by a companies set in place data governance policy as this will protect all stakeholders tied to the business and the data stored within it, therefore avoiding any potential punishments such as fines.

# **Second Task**

**Step 1. “Set a password to protect the workbook”.**

To start I would open the excel document and navigate to the “Review” bar located at the top of Excel and select the protect workbook option. I would then input the password and be prompted to repeat the password. The workbook is now password protected.

**Step 2. “Highlight column C and change the data to display in British Pounds symbol”.**

Next I would highlight column C by either left clicking the column by the letter C at the top and then right clicking to select the “Format Cells” option.

From here it would take me to the “Number” tab where I would select the “Currency” option from the list on the left and then manually select the GBP symbol from the dropdown box called “Symbol”. For the sake of cleaning up the data i will also set the “Decimal places” box from the set default of “2” to “0”, As there is no pence included in the data the decimal places are unnecessary data that can be cleansed to make it neat and tidy.

GDP Task (Excel)

## GDP Task (Excel)

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**Step 3. “Turn the GDP sheet into a table”.**

Firstly, I selected anywhere within my set of data and inserted the following shortcut “CTRL + A” which highlights and outlines all information in the dataset fully. From here I would navigate to the “Insert” tab at the top of Excel and select the Table option. From here a prompt will open asking where the data for my table is but as I originally highlighted and outlined it all with the shortcut from before I can continue and click the “Ok” box.

This then turned my dataset into a table format which I can style to my desire by navigating to the new tab located at the top labelled “Table Design”.

**Step 4. “Filter the table to display on the information for 2019”.**

The previous step should automatically have created dropdown filters selectable by clicking the down arrow beneath the headings for the dataset as shown in the attached images.

In this circumstance I would select the arrow in the “Year of information” heading which would open the filter tab. I would then search for “2019” in the search box shown in the image, make sure 2019 is selected and then click “Ok”. This will filter the information so that the data from 2019 is the only data displayed in the table.

GDP Task (Excel)

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**Step 5. “Next create a chart that will only display the following data “Rank, Country and GDP -per capita (PPP).”**

For this step I will highlight the “Rank”, “Country” and “GDP” columns by left clicking the column “A” and dragging it to highlight “A”, “B” and “C” columns.

Next, I will select the “Insert” tab at the top of the document and select the “Recommended charts” option. From here I’m not happy with the charts being recommended so I will select the tab “All Charts”. I selected “column” from the list on the left side and selected the first option labelled “Clustered Column” once done I selected “Ok” and it presented me with my chart. The chart was very cluttered and too small, so I decided to enlarge it to made it easier to read.

**Step 6. “Using your creative skills edit the chart”.**

1. **Add a title.**
2. **Add X and Y axis labels.**
3. **Make the chart visually pleasing.**

As the chart had already created a chart title for me, I didn’t need to add it, but in the event I did. I would select the chart and in the top right a “+” box will appear, select this and ensure “Chart Title” is selected to enable it. While I was here, I turned on “Axis Titles” to add the X and Y axis to my chart.

I decided to change heading of the chart title and the X and Y axis to something more suitable by double clicking on the textbox and erasing the original information then re-entering a more suitable title.

GDP Task (Excel)

A screenshot of a chart

Description automatically generated

A screen shot of a graph

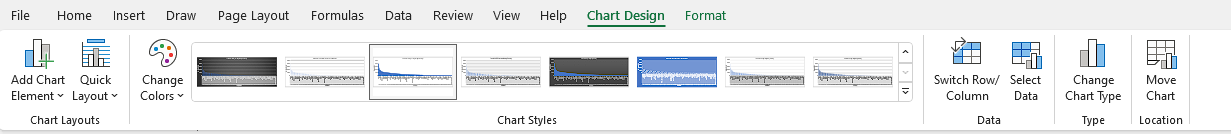
Description automatically generated

A screenshot of a chart

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A screenshot of a computer screen

Description automatically generated

To make the chart a bit more visually pleasing I right clicked on the Y axis and formatted it so that the chart will show the GDP increasing in stages of £20,000 by inserting “£20,000” In the “major” box under “units” located on the right-hand side. I also changed the “maximum bounds” to “£200,000” as no country peaked over this. This makes it cleaner to distinguish the highest point and the gaps between the sum of each country’s GDP per capita.

I also added a finishing touch of using the “Chart Design” tab located at the top once you’ve selected the chart. I selected a “Chart Style” preset that was a bit cleaner and easier to read.

**Step 7. “Move the chart to a new sheet tab and label with a suitable name”.**

To do this I simply selected the chart and right clicked to then select the “Move Chart” option.

A popup would open form here where I would select “New sheet” and rename it to “GDP per capita by Country” and then hit “Ok”. A new sheet would open dedicated for the chart and would show at the bottom left alongside the other sheets in the document.

**Step 8. “Create a sort for the top 20 highest ranking countries.”**

For this step I will select the filter dropdown on the data with the heading “GDP – per capita (PPP)” and select the “Top 10” option. From here a box will appear and I will edit the box in the centre which had a default of “10” to “20” then hit “Ok”. This should then give us a table that displays the top 20 countries based on GDP per Capita.

GDP Task (Excel)

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**Step 9. “Create a new bar chart to display the 20 highest ranking countries from your sort and position the chart beneath the table”.**

Here I highlighted the appropriate data being the “rank”, “country” and “GDP” columns in the table followed by selecting the “2D Clustered Bar” chart option under the charts section in the ”Insert” tab.

I then sized the chart so it’s visible and clear beneath the table as shown in the attached image. I also added the “data labels” and “legend” option to the chart to give it a more clear understanding.

**Step 10. “Colour the background behind the chart**

To complete the final step I selected the area behind the chart by left clicking the top left cornered cell behind the chart and dragging downwards to the bottom right cornered cell, and then choosing an appropriate colour by selecting the Bucket tool located in the “Font” section under the “Home” tab. Once complete the background behind the graph should change colour.

**This is the End of the GDP Tasks in the Excel Worksheet**

GDP Task (Excel)

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## Macro Task (Excel)

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**Step 1. “Create 3 macro buttons. Print the sheet, Save the file, Copy the sheet”.**

First, I created the buttons using the “Shapes” tool located under the “Insert” tab as shown in the attached image.

I created a rectangle for the Print button, a circle for the Save button and a triangle for the Copy button. Once created I inserted the text “Print”, “Save” and “Copy” within the shapes by clicking on the shape and typing the name for each of the commands I will attach to them. And for a better visual of the buttons, I edited them using various features under the “Shape Format” tab.

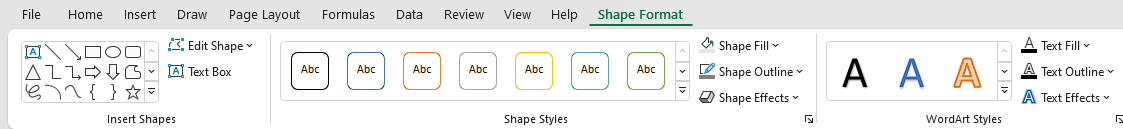
For every Macro I want to create I need to navigate to the “View” tab and select “Macros” and then “Record Macro” to get started. A box will appear as shown in the images attached and I will enter a relevant Macro name and a brief description of what the macro does. Once done click I clicked “Ok”.

Now the macro is recording I want to carry out the command I wish the macro to record, in this case I want it to record me copying the relevant data, which is a table of data and graph of the data from the previous GDP task. To do so I will highlight all the relevant information as shown as the right click in the highlighted area to select the copy command. Once done I will navigate back to the “View” tab and select “Macros” and then finally “Stop recording”.

The macro is complete but now I need to assign it to the relevant button, so here I right clicked the shape known as “Copy” and selected the option “assign macro”. A box will appear and from here I selected the “Copy” macro then finished by clicking “Ok”. Once done I can select the shape known as copy to see that the macro is working, and the relevant data is being copied.

Macro Task (Excel)

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**Step 2.” Using the copy macro, copy the sheet and then paste it into a new word document keeping the formatting. Then rename the page with a title of ‘GDP (Gross domestic product)’”.**

For this step I selected the shape I setup as my copy macro as shown and it copied the area highlighted as it is supposed to.

I opened a new word document and titled the page to the title asked, and edited the text to bold, centred, underlined and make it slightly larger.

To paste the data, I copied into the document while keeping the same formatting I right clicked beneath the title and selected the first option shown in the attached image under “Paste options” known as the “Keep source formatting” option.

**Step 3.” Save your document as ‘World Gross Domestic Product Report 1’”.**

To do this I selected the following options: File > Save as > Browse (Select an appropriate location) > Rename the file name > Save.

**Step 4.” Add a header and footer to the Excel sheet”.**

Adding a header and footer was done by navigating to the “GDP” excel worksheet and then selecting the “View” tab where I would select the “Page Layout” option under “Workplace Views”.

**Step 5.” In the header enter your name and ‘GLA DATA 1’ in the three boxes”**

Inside the “Add header” boxes I typed my first name in the first box, last name in the middle box, and “GLA DATA 1” in the final box.

Macro Task (Excel)

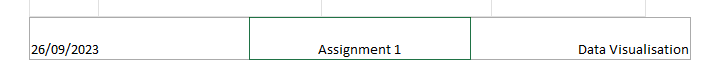
A screenshot of a computer

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A screenshot of a computer

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**Step 6.” In the footer add todays date then ‘Assignment 1’ and lastly ‘Data Visualisation’”**

Like in the step before I repeated the same thing but this time on the footer of the page located at the bottom. Entering today’s date in the first box, “assignment 1” in the second box and “Data visualisation” in the final box.

**Step 7.” Return to normal view”.**

I selected the “View” tab and switched from the “Page Layout” option to “Normal” under “Workbook Views”.

**Step 8.” Save your table as ‘Excel Gross Domestic Product Report 1’”.**

For this I selected File > Save as > Browse (Find an appropriate location) > Rename the file name to “Excel Gross Domestic Product Report 1”

I also changed the file type to “Excel Macro-Enabled Workbook” as macro enabled workbooks cannot be saved as a typical “Excel Workbook” type.

**Step 9.” Close your word document only”.**

As the word document is now completed and saved, I closed by selecting the X in the upper right corner.

**This is the End of the Macro Task in the Excel Worksheet**

Macro Task (Excel)

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# **Third Task**

## Tableau Task

For the third task I’m going to be using Tableau ensuring I complete my task by the following criteria:

1. Importing the data
2. Setting relationships
3. Checking the data types
4. Building four visualised charts while removing any null values
5. Compiling all my charts into one final dashboard

A screenshot of a computer

Description automatically generated**Step 1. “Importing the data”.**

A screenshot of a computer

Description automatically generatedTo begin with I’m going to be importing the dataset that I was using in previous tasks known as the “The wealth of nations” excel dataset. To import this data, I’m going to open the Tableau program and select the “file” tab in the top left followed by “open”, From here I will select the dataset that I’m going to be working with and finally select “open”. This should open the dataset within Tableau.

A screenshot of a computer

Description automatically generated**Step 2. “Setting relationships”.**

Once the document is imported into Tableau my next task is to set relationships between the different datasets in the document. To do this I selected the “GDP” table under “Sheets” and dragged it into view as shown, once done I will do the same thing with the sheet titled “Life Expectancy”.

A red and black sign with a red exclamation mark

Description automatically generated

This should create a line between the two tables in view, this is to say there has been an error when Tableau has automatically tried to set relationships between the two tables so now, I’m going to manually create the relationships to solve this. At the bottom of the worksheet, it should show “GDP” and “Select a field” beneath it. Select the field and it should give a dropdown, from here we’re going to select “Country”. There should also be a title of “Life Expectancy” and select a field beneath it like we just did. Select the field and then select the” Country (Life Expectancy)” option. This should create a relationship between the two tables. As there is still an additional table, we did not drag into the worksheet known as “Smartphones” we will do that now. The layout it inserts as does not matter in this instance as all the worksheets interact with one another if we set the correct relationship. For this table repeat the same steps as before. Select the fields and insert the option that involves “Country” within it. Once done all tables should have correctly set relationships.

A screenshot of a computer

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A diagram of a life cycle

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**A screenshot of a phone number

Description automatically generatedStep 3. “Checking the data types”.**

A screenshot of a graph

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Description automatically generatedThe next step to do is to check the data types within Tableau. So, after completing the previous step I have three tables within my worksheet. To check the data type I selected the field above the column titles in the bottom/bottom right of the document as shown within the screenshot attached. Here I can see the different data types available to select. For this current table selected which is the “Smartphones” table I’m going to go through each column and ensure the data type selected for the column is appropriate and fitting for the information it contains. The only change to the “Smartphone” table I will make is to change the data type for the “Date of information” column to a String. That is all for this table, now I’m going to select another table within the relationships view known as “GDP”.

**A screenshot of a computer

Description automatically generated**Within the GDP Table I’m going to change the data type in the column “Year of information” from a “Number (whole) to a “String” This is to match the trend as done in the previous table where we are going to turn the years information into a “String” format.

Finally I will select the “Life Expectancy” table and once again change the “Date of information” column to a string, this is to match the trend as before and also remove the column that is inserted between the “2020” fields, I could change the “Life expectancy at birth” column to a whole number data type to remove the excess information beyond the decimal but for the sake of accuracy I’m going to leave it as a decimal. Once this is done all data fields have been checked and amended as needed.

**Step 4. “Building four visualised charts while removing null values”.**

Before creating any charts, I will note that my client is only interested in the Top 20 highest ranking countries so I will limit every visual to the Top 20 Countries, the client also requested that all visuals created should be appropriate for those who are colour blind so I will follow this instruction throughout the creation of these visuals.

The charts I will create will be as follows:

1. Top 20 Countries by Life Expectancy
2. Top 20 Countries by Smartphone Users
3. Top 20 Countries by GDP per capita
4. Trend in GDP

I will only show tutorials on how I create the first two charts, the other two will be done with no explanation.

A screenshot of a computer

Description automatically generatedThroughout all my charts I will be referring to the data on the left-hand side of the screen underneath the “Tables” heading. Double clicking any of these tabs or drag and dropping them into the correct columns will apply them to the chart and allow me to create visualised data.

**Top 20 Countries by Life Expectancy**

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Description automatically generated**A screenshot of a computer

Description automatically generated**For the first chart I’m going to double click the “Country (Life Expectancy)” to add it to the visual, this should automatically create a geographical map but I’m going to manually change this to a table format by clicking the “Show me” tab in the top left and selecting the first option “text table”. Next, I’m going to double click the “Life expectancy at birth” data and the “Rank (Life Expectancy) option. The data will look quite scattered but to limit this to the top 20 countries by ranking I am going to right click “Rank” under the “Measure Values” section and select “Filter” next I’m going to lower the range of values from 1-196 to 1-20, then click apply. This has now categorised the table into top 20 ranking countries by life expectancy. I’m also going to right click the” Rank” data under “Measure Values” again and this time select the “Format” option. This should open the format tab on the left side of the screen, from here I will select the numbers dropdown and select the “Number (Custom)” option to then lower the decimal places to zero. This should remove the extra decimal places after the ranking number which aren’t necessary. I’m going to sort the table from highest ranking to lowest by selecting the sort of icon which shows when hovering over the “Rank” column in the visual. Finally, I will rename the sheet by double clicking the “Sheet 1” in the bottom left and changing it to something more appropriate, in this case “Top 20 Countries by Life Expectancy” is more fitting. This should also change the title above the table visual.

****A screenshot of a computer

Description automatically generated**A screenshot of a computer

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A screenshot of a computer

Description automatically generated**Top 20 Countries by Smartphone Users**

1. Begin adding the “Country (Smartphones)” data by double clicking.
2. Add “Smartphone Users” data to the visual by double clicking it.
3. Double click “Rank (Smartphones) to add it to the visual.
4. Right click the “Rank” colour mark, select filter. Lower the range of values from 74 to 20 to filter to Top 20 Ranking Countries.
5. Change the Marks section from “Automatic” to “Map” in the dropdown.
6. Change the Smartphone Users mark from colour to Label.
7. Click colour in marks and select a greyscale appropriate colouring for colourblind audiences.
8. A screenshot of a computer

   Description automatically generatedRight click anywhere in the sizing filter on the top right and select “Edit sizes”.
9. A screenshot of a computer

   Description automatically generated Change “Sizes vary” to “By range” and turn on the “Reversed” option (This will make the circles appear largest to smallest in ascending to descending order), Change the Mark size range so that the circles are visually distinguishable by highest to lowest.
10. A screenshot of a computer

    Description automatically generatedFormat the “Smartphone Users” mark to “Number (Custom)”, set “Display Units” to Millions and change the “Decimal Places” to one.
11. Add “Rank” as a label mark and change the sizing of labels to “Size 8”.
12. Rename the sheet to “Top 20 Countries by Smartphone Users”.

**Step 5. “Compiling all my charts into one final dashboard”.**

A screenshot of a computer

Description automatically generatedTo create a dashboard there is an icon like where you would create a new sheet, “New dashboard”. Selecting this opens a fresh dashboard to display my visuals on. Here are the steps I took from here:

1. A screenshot of a computer

   Description automatically generatedDashboard > Select Size Downdown > Select Range Dropdown > Select Automatic. This should make the page larger for me to display my visuals together on.
2. In the bottom left switch from “Tiled” to “Floating”. This allows me to move and freely change the sizings of the visuals I implement rather than having them automatically fixed.
3. A screenshot of a computer

   Description automatically generatedOne by one double click on all pages located under the section “Sheets”. This should implement all graphs made on the corresponding sheet names, once done resize them as appropriate.
4. Select the background of the dashboard and navigate to the “Layout” tab, then select “Background” then I selected a appropriate background colour. Once done I select the “ “Border” option and inserted an appropriate border.
5. On the “Dashboard” tab turn on “Show dashboard title” in the bottom left, then repeat Step 4 on the Dashboard title by double clicking the dashboard name.
6. A screenshot of a computer

   Description automatically generatedI inserted a text field by navigating to the “Dashboard” tab and choosing the “Text” option under the “Objects” tool. In the bottom left. In this text box I will summarise everything I learned from the four graphs and then position it and size it presentably.
7. Lastly, I renamed the dashboard to “Top 20 Countries” as this was fitting of the data it resembled.

The Tableau document I created is online on Tableau Public and if you wish to view and interact with it you may through visiting the following link:

<https://public.tableau.com/views/Top20CountriesAssignment1-DataVisualisation/Top20Countries?:language=en-GB&publish=yes&:display_count=n&:origin=viz_share_link>

# Reflection

To add a reflection on my assignment I think I did very well. I believe it I has improved my technical skills with each individual program a lot. I’ve learned how to be more efficient and find shortcuts within Excel, Tableau and even in this word document to complete certain tasks that I originally would’ve taken slightly longer with.

I’ve played with Macros in Excel before, but I have lost experience overtime, this assignment was a very nice touch-up and I’ll now have a greater knowledge of them for next time I use them. I feel as though my presentation skills within Tableau has improved tremendously. Before I was quite nervous when using it but now, I feel more comfortable. I had a big issue with dashboard sizing but after a bit of experimenting with the layout settings I discovered how to change this, and it’ll make creating presentable dashboards a lot easier for me.

This has taught me that practise makes perfect, and you can never have enough. I look forward to upskilling my knowledge even higher in these programs, and even discovering new software to help me visualise data and present it even smoother.