Test cases will be provided in the form of a table as follows:

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| **Test ID** | The unique Id of the test case |
| **Category** | Which part of the system is tested (*e.g. evaluation of user  credentials stored on file or DB*) |
| **Requirements Coverage** | The unique ID of the requirement tested (*e.g. UC1-Successful-User-Login*) |
| **Initial Condition** | Initial conditions required for the test case to run (*e.g. the system has been initiated and runs*) |
| **Procedure** | The list of steps required for this test case (*e.g.*  *1. The user selects login*  *2. The user provides a user name*  *3. The user provides a password*  *4. The user logs-in into the system and is presented with the main UI window*) |
| **Expected Outcome** | The expected outcome of the test case (*e.g. the login form closes, and the user is presented with the main UI window*) |
| **Notes** | Any other notes you may want to add for this test case, which are also reflected in the requirements specification (*e.g. the user should provide only alphanumeric user names and passwords without any special characters*) |

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| **Test ID** | Test case 1 |
| **Category** | Evaluation of user credentials stored on DB |
| **Requirements Coverage** | UC1-Successful-User-Login |
| **Input data** | Username and password |
| **Initial Condition** | The system has been initiated and runs |
| **Procedure** | 1. The users are greeted with a login window  2. The user inputs a user name  3. The user inputs a password  4. The user clicks the submit button to log into the system and is presented with the main UI of the application |
| **Expected Outcome** | The login window closes, and the user is presented with the main UI of application. |
| **Notes** | The user should provide only alphanumeric user names and passwords without any special characters within specific length. And both the user names and passwords can not be null. |

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| **Test ID** | Test case 2 |
| **Category** | Evaluation of user credentials stored on DB |
| **Requirements Coverage** | UC1-Unsuccessful-User-Login |
| **Input data** | Username and password |
| **Initial Condition** | The system has been initiated and runs |
| **Procedure** | 1. The users are greeted with a login window  2. The user inputs a user name  3. The user inputs a password  4. The user clicks the submit button, a pop-up window notify the user that there is an error with the provided credentials and the application will terminate |
| **Expected Outcome** | The application terminates and the user has to re-enter the system to provide valid user name and password. |
| **Notes** | The user should provide only non-nullable alphanumeric user names and passwords without any special characters within specific length. And the user cannot login unsuccessfully for too many times in short period (to increase the security of user account). |

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| **Test ID** | Test case 3 |
| **Category** | Evaluation of countries added to the list of countries |
| **Requirements Coverage** | UC2-Successful-Country-Adding |
| **Input data** | Name of country |
| **Initial Condition** | The user has logged into the system and the main UI of application is displayed. |
| **Procedure** | 1. The “Add a country” bar is presented to users  2. The user types the name of the country or select the country from a drop-down menu on the “Add a country” field  3. The user selects the “add” button to add the country to the list of countries to perform analysis of  4. The user selects which analysis to be performed on the country  5. The country that the user selects is added into the list of countries, on which analysis is to be performed. The country’s name will also be displayed on the UI panel along with all the other so far selected countries. |
| **Expected Outcome** | The country name along with the analysis to be performed on the specific country will be added to the list of countries as well as displayed on the UI panel. |
| **Notes** | The user should provide only non-nullable alphanumeric country name without any special characters within specific length. And the user can only provide country name one at a time. |

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| **Test ID** | Test case 4 |
| **Category** | Evaluation of countries added to the list of countries |
| **Requirements Coverage** | UC2-Unsuccessful-Country-Adding |
| **Input data** | Name of country |
| **Initial Condition** | The user has logged into the system and the main UI of application is displayed. |
| **Procedure** | 1. The “Add a country” bar is presented to users  2. The user types the name of the country or select the country from a drop-down menu on the “Add a country” field  3. The user selects the “add” button to add the country to the list of countries to perform analysis of  4. An error message displayed on the window |
| **Expected Outcome** | An error message displayed on the window and the adding operation failed. |
| **Notes** | The user should provide input within specific length. |

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| **Test ID** | Test case 5 |
| **Category** | Evaluation of countries removed from the list of countries |
| **Requirements Coverage** | UC3-Successful-Country-Removing |
| **Input data** | The name of country that want to removed |
| **Initial Condition** | The user has logged into the system and the main UI of application is displayed. |
| **Procedure** | 1. The “Remove a country” bar is presented to users  2. The user types the name of the country or select the country from a drop-down menu on the “Remove a country” field  3. The user selects the “remove” button to remove the country from the list of countries to perform an analysis on  4. The country selected is removed from the list of countries, on which analysis is to be performed on |
| **Expected Outcome** | The country name along with the analysis to be performed on the specific country will be removed from the list of countries |
| **Notes** | The user should provide only non-nullable alphanumeric country name without any special characters within specific length. And the user can only provide country name one at a time. |

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| **Test ID** | Test case 6 |
| **Category** | Evaluation of countries removed from the list of countries |
| **Requirements Coverage** | UC3-Unsuccessful-Country-Removing |
| **Input data** | The name of country that want to removed |
| **Initial Condition** | The user has logged into the system and the main UI of application is displayed. |
| **Procedure** | 1. The “Remove a country” bar is presented to users  2. The user types the name of the country or select the country from a drop-down menu on the “Remove a country” field  3. The user selects the “remove” button to remove the country from the list of countries to perform an analysis on  Two condition:  3.1. If the country is not in the known countries list, an error message is display, showing that errors occur on the country name.  3.2. If the country name is in the known countries list, but the country name is not in the first place of the list of selected countries, an error message indicating that the country users want to remove from the list was not in there in the first place |
| **Expected Outcome** | An error message indicating the country name that user selected is invalid (not in the known countries list) or not in the first place of the selected countries list is displayed. |
| **Notes** | If the given country name to be removed is in the known country list, the system only needs to check if the country name is in the first place of the selected countries list. The system does not need to check if the country name will occur in the selected countries list or not. |

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| **Test ID** | Test case 7 |
| **Category** | Evaluation of analysis |
| **Requirements Coverage** | UC5-Successful-Country-Analysis |
| **Input data** | total confirmed Covid- 19 cases to date; selected country’s population; Covid-19 confirmed cases for women; Covid-19 confirmed cases for men. |
| **Initial Condition** | The user has selected the countries to perform analysis on. |
| **Procedure** | 1. The user selects the specific type of analysis they want to perform from a drop-down menu of available analyses (4 different types in total).  2. The user presses the “Recalculate” button to perform analysis.  3. The system identifies and retrieves the individual pieces of data required for the type of analysis selected.  4. The system performs the calculation and returns the result of analysis.  5. The system display the result to the user. |
| **Expected Outcome** | The analysis proceeds correctly and the results are returned and displayed to the user. |
| **Notes** | The same analysis has to be performed for all selected countries. |

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| **Test ID** | Test case 8 |
| **Category** | Evaluation of analysis |
| **Requirements Coverage** | UC5-Unsuccessful-Country-Analysis |
| **Input data** | Total confirmed Covid- 19 cases to date; selected country’s population; Covid-19 confirmed cases for women; Covid-19 confirmed cases for men. |
| **Initial Condition** | The user has selected the countries to perform analysis on. |
| **Procedure** | 1. The user selects the specific type of analysis they want to perform from a drop-down menu of available analyses (4 different types in total).  2. The user presses the “Recalculate” button to perform analysis.  3. The system cannot identify and retrieve all the individual pieces of data required for the type of analysis selected.  4. An error message is displayed to the user. |
| **Expected Outcome** | The analysis proceeds incorrectly and the error message is returned and displayed to the user. |
| **Notes** | The same analysis has to be performed for all selected countries. |

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| **Test ID** | Test case 9 |
| **Category** | Evaluation of data read from web site |
| **Requirements Coverage** | UC5-Successful-Data-Read |
| **Input data** | Selected analysis type |
| **Initial Condition** | The user has selected the countries to perform analysis on, and has selected the specific analysis type. |
| **Procedure** | 1. According to the selected analysis type, the system sends a request to web sites to read the specific data required to perform the analysis.  2. All the required individual pieces of data can be found on the website and the website return those data to the system |
| **Expected Outcome** | All the specific data required for performing the analysis can be found and returned from the appropriate web site. |
| **Notes** |  |

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| **Test ID** | Test case 10 |
| **Category** | Evaluation of data read from web site |
| **Requirements Coverage** | UC5-Unsuccessful-Data-Read |
| **Input data** | Selected analysis type |
| **Initial Condition** | The user has selected the countries to perform analysis on, and has selected the specific analysis type. |
| **Procedure** | 1. According to the selected analysis type, the system sends a request to web sites to read the specific data required to perform the analysis.  2. Some or all of the required data for selected analysis type are not available on the website or error occur when the website tries to return the data to the system  3. The website return an error message to the system  4. An error message is displayed to the user |
| **Expected Outcome** | The system receives an error message indicating that error occur when reading data from the web site. And the error message is displayed to the user. |
| **Notes** |  |

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| **Test ID** | Test case 11 |
| **Category** | Evaluation of displaying the result |
| **Requirements Coverage** | UC6-Successful-Display-Result |
| **Input data** | All calculated data that user required |
| **Initial Condition** | The selected statistical analysis is completed and its results have been calculated and are ready to be displayed. |
| **Procedure** | 1. According to the results of statistical analysis, the system will be able to render the data in different colors (or shapes).  2. Display the data on the map intuitive |
| **Expected Outcome** | The results are displayed correctly and intuitively. |
| **Notes** | Do not just display the results in text or using very small or overlapping characters to represent analysis results between countries. Do not having infinitesimally small circles for countries with very low population. |

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| **Test ID** | Test case 12 |
| **Category** | Evaluation of displaying the result |
| **Requirements Coverage** | UC6-Unsuccessful-Display-Result |
| **Input data** | All calculated data that user required |
| **Initial Condition** | The selected statistical analysis is completed and its results have been calculated and are ready to be displayed. |
| **Procedure** | 1. According to the results of statistical analysis, the system will be able to render the data in different colors (or shapes).  2. The data displayed on the map is not intuitively (might be a lot of overlapping or the symbols used to represent data is not appropriate). Or the data is not correct. |
| **Expected Outcome** | The results are not displayed correctly and intuitively. |
| **Notes** |  |

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| **Test ID** | Test case 13 |
| **Category** | Evaluation of oval dimension |
| **Requirements Coverage** | Successful-calculate-dimension |
| **Input Data** | Max value; minOvalDimension; percentage |
| **Procedure** | 1. Get maxOvalDimension  2. Get minOvalDimension  3. Get percentage (i.e. percentage = cases.get(inputCountry)/maxValue)  4. calculate the oval dimension (i.e. (((maxOvalDimension - minOvalDimension) \* percentage) + minOvalDimension); |
| **Expected Outcome** | The dimension of oval is calculated and display on the map |
| **Notes** |  |

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| **Test ID** | Test case 14 |
| **Category** | Evaluation of oval dimension |
| **Requirements Coverage** | Unsuccessful-calculate-dimension |
| **Input Data** | Max value; minOvalDimension; percentage |
| **Procedure** | 1. Get maxOvalDimension  2. Get minOvalDimension  3. Get percentage (i.e. percentage = cases.get(inputCountry)/maxValue)  4. calculate the oval dimension (i.e. (((maxOvalDimension - minOvalDimension) \* percentage) + minOvalDimension); |
| **Expected Outcome** | The dimension of oval is calculated and display on the map |
| **Notes** |  |