# Test Description

**Test Name or ID**: void printMap(), int getNumRows(), struct Map addRoute(), int getNumCols()

**Test Type**: Black box

**Description**: The following test data are used to test each function separately. These functions can be found in mapping.c. These testing data adhere to blackbox testing principles, where the user is unaware of the details of the functions or how the functions work.

**Setup:** These test data will be run on the functions with gcc compiler in visual studio code

**Test Function**: name of the test function associated with this description.

**Test Scenarios:**

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| Description | Test Data | Expected Result | Actual Result | Pass/Fail |
| void printMap(const struct Map\* map, const int base1, const int alphaCols) | Negative base1 and alphaCols  Base1 = -2  alphaCols = -5 |  | The column numbering on the output begins from -2 | FAIL |
| void printMap(const struct Map\* map, const int base1, const int alphaCols) | Invalid struct value.  Struct=0 | Print only column and row numbers | Results in an error because a struct is needed to store and retrieve information. Exception error is thrown | FAIL |
| void printMap(const struct Map\* map, const int base1, const int alphaCols) | valid base1 and alphaCols values  Base1 = 1  alphaCols =1 |  | Output map with the correct or valid values | PASS |
| void printMap(const struct Map\* map, const int base1, const int alphaCols) | Invalid input for base1 and alphaCols. Characters instead of numbers  Base1=abc  alphaCols =eee | Prompt user about the invalid value inputted | Function does not run because the expected value should be integers rather the test data are characters | FAIL |
| int getNumRows(const struct Map\* map) | Invalid pointer to the map struct. - nullptr | Return number of rows of base map | Does not return the number of rows since the struct is empty or invalid. Results in an error | FAIL |
| int getNumRows(const struct Map\* map) | Map with valid number of rows  MAP\_ROWS 25 |  | Return 25 as number of rows | PASS |
| struct Map addRoute(const struct Map\* map, const struct Route\* route); | Valid map and route struct  &baseMap, &blueRoute |  | Blue route is added successfully | PASS |
| struct Map addRoute(const struct Map\* map, const struct Route\* route); | Unknown route struct  &redRoute | Add redRoute which is unkown | Program does not run. An error is returned. The &redRoute is an unknown route and therefore causes | FAIL |
| struct Map addRoute(const struct Map\* map, const struct Route\* route); | Null route pointer | Do not add any route | Results in an error because a route is needed in order for it to be added | FAIL |
| int getNumCols(const struct Map\* map); | Map with valid number of columns  MAP\_COL 25 |  | Returns 25 as the number of columns. This value comes from preprocessor directive | PASS |
| int getNumCols(const struct Map\* map); | Invalid pointer to the map struct. – nullptr | Prompt user about the missing struct. | Does not return the number of columns since the struct is empty or invalid. Results in an error | FAIL |

**Bugs Found**:

The functions above are seen not to handle invalid data correctly. The functions should be redefined to handle cases where invalid or no data is passed to certain functions.