COMP281- Principles of C and Memory Management

Problem 1048

This program receives input n that will be used to allocate memory for the array of dates and to make sure the correct number of inputs is received. After that n amount of inputs are stored inside the date structure and then into the array. The months are changed from a string to integer to be used for calculations. Finally, the program receives a query date that will need to be checked against the inputted dates. Once all the input is received, the built-in function qsort is used to sort the date array. The sorting sorts first by year then by month and finally by day. The built-in function bsearch is used to find the query date. The sorted array is then outputted (the integer month is changed back to string) and either 'Yes' or 'No' depending on whether the query date was found.

Problem 1082

This program receives a string input, either "odd" or "even". This string input will decide how the program sorts the input values. The next input is an integer length that will be used to allocate memory for the array of values and to make sure the correct number of values are received. The final input is a list of values that will be stored into the array. A function is then used to separate the even or odd numbers (depending on what the user decided). If even is selected the function will remove all the even numbers and store them in a separate sort array. The values in this sort array are then sorted using the built-in qsort function. The values are then read back into the normal array. However, it only overrides the even values and ignores the odd values to insure position integrity of the odd values. The new array is then outputted.

Problem 1084

This program receives input for number of rows and number of columns which are then used to allocate enough memory in a 2D array to simulate a highway grid. There is also the number of time steps which is responsible for deciding how many time instances are simulated. A structure array is declared that stores arrival time and the row index of each car, this array acts as a schedule. Cars are represented by '"1"s in the grid and empty spaces are represented by "."s. The movement of the vehicles is executed in two phases; movement and arrival. The movement phase moves all existing vehicles on the highway one column to the right. If they go off the grid they're removed. The arrival phase adds new vehicles onto the grid starting from column 0. Once all the movement and arrivals have been simulated to the correct time steps the final state of the grid is outputted.