

It is required to write your own methods for sorting and searching. Do not use Java Collections.

- Enhance the GDP program you have completed in Assignment 1 or Assignment 2 so that the user can perform searching and sorting on array or ArrayList.
 - Write a method that uses the **selection sort** algorithm to sort the array or ArrayList based on the population in ascending or descending order. Call the method in the main method.
 - Write a method that uses the **quick sort** algorithm to sort the array or ArrayList based on the country name in ascending order (A – Z). Call the method in the main method.
 - Write a method that uses the **binary search** algorithm to search the array or ArrayList based on the country name. In the main method, prompt the user to enter a country name, then call the method to search it and output the country information if found.

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1 - Output the country information
2 - Output the average GDP
3 - Output the country with the highest GDP per capita
4 - Search a country and output its information
5 - Output countries in each UN statistical region
6 - Sort the list based on the population in ascending or descending order (selection sort)
7 - Sort the list based on the country name in ascending order (quick sort)
8 - Search the list based on the country name (binary search) and output the country info. if found
0 - Exit

```

- (Written Exercise) Use the following **Partition** algorithm to partition the array A:

| | | | | | | | | | |
|---|---|----|----|---|---|----|---|---|----|
| 9 | 2 | 14 | 15 | 7 | 6 | 19 | 8 | 3 | 20 |
|---|---|----|----|---|---|----|---|---|----|

```

Partition(A, p, r)
  x = A[p]
  i = p - 1
  j = r + 1
  while (true)
    repeat j = j - 1
    until A[j] <= x

    repeat i = i + 1
    until A[i] >= x

    if i < j
      exchange A[i] and A[j]
    else
      return j

```

A is an array of integer
p is the left-most index of A
r is the right-most index of A

Show your work. You need to show the following:

- the value of x
- the values of i and j after each iteration of the inner loops (repeat ... until)
- the values of A[i] and A[j] after each exchange
- the content of the array A after Partition is ended
- the returned value j

Due: Wednesday, 10/26/22