**Lab Worksheet 05**

Please complete all the problems described below

Use the array of country names attached at the end of this document to complete the following tasks.

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| **Example Task 1** | |
| **Task** | Implement the Java method called linearSearch*(int[] num, int searchKey)* which accept an array of integers and searchKey to perform a linear search. The method returns the index if the searchKey is found in the array, and -1 otherwise. |
| Code Snippet | Use the code we used in the lecture class |
| Note | Check the time complexity of your algorithm |
| Time Complexity | O(N) |

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| **Example Task 2** | |
| **Task** | Implement the Java method called binarySearch*(int[] num, int searchKey)* which accept an array of integers and searchKey to perform a binary search. The method returns the index if the searchKey is found in the array, and -1 otherwise. |
| Code Snippet | Use the code we used in the lecture class |
| Analysis | Check the time complexity of your algorithm |
| Time Complexity | ???  O(log n) |

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| **Example Task 3** | |
| **Task** | Write a java method called linearSearch*(String[] countries, String searchKey)* which accept a country name input from the user and search the country name in the countries array and return the country name if found or -1 otherwise. |
| Code Snippet | Modify your code under Task 1 to handle strings. This is method overloading. |
| Analysis | Check the time complexity of your algorithm |
| Time Complexity | ??? |

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| **Example Task 4** | |
| **Task** | Modify the Merge sort Java code we used in the class to sort string values. Sort the name of the countries in alphabetical order (A to Z) using merge sort. |
| Code Snippet |  |
| Analysis | Check the time complexity of your algorithm |
| Time Complexity | ??? |

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| **Example Task 5** | |
| **Task** | Write a java method called binarySearch*(String[] countries, String searchKey)* which accept a country name input from the user and search the country name in the countries array and return the country name if found or “country not found message” otherwise |
| Code Snippet |  |
| Analysis | Check the time complexity of your algorithm. Analyse the performance and compare it with linear search |
| Time Complexity | ??? |
| Note | Use one of the sorting algorithms perhaps from Task 4, to apply the binary search as binary search requires sorted array. |

Copy the following text as part of your string array in Java

String[] countries = new String[]{"Afghanistan", "Albania", "Costa Rica", "Cote d'Ivoire", "Croatia (Hrvatska)", "Cuba", "Cyprus", "Czech Republic", "Denmark", "Djibouti", "Dominica", "Dominican Republic", "East Timor", "Ecuador", "Egypt", "El Salvador", "Equatorial Guinea", "Eritrea", "Estonia", "Ethiopia", "Falkland Islands (Malvinas)", "Faroe Islands", "Fiji", "Algeria", "American Samoa", "Andorra", "Angola", "Anguilla", "Antarctica", "Antigua and Barbuda", "Argentina", "Armenia", "Aruba", "Australia", "Austria", "Azerbaijan", "French Guiana", "French Polynesia", "French Southern Territories", "Gabon", "Gambia", "Georgia", "Germany", "Ghana", "Gibraltar", "Greece", "Greenland", "Grenada", "Guadeloupe", "Guam", "Guatemala", "Guinea", "Jamaica", "Japan", "Jordan", "Kazakhstan", "Kenya", "Bahamas", "Bahrain", "Bangladesh", "Barbados", "Belarus", "Belgium", "Belize", "Benin", "Bermuda", "Bhutan", "Bolivia", "Bosnia and Herzegowina", "Botswana", "Bouvet Island", "Brazil", "British Indian Ocean Territory", "Brunei Darussalam", "Bulgaria", "Burkina Faso", "Burundi", "Cambodia", "Cameroon", "Canada", "Cape Verde", "Cayman Islands", "Central African Republic", "Chad", "Chile", "China", "Christmas Island", "Cocos (Keeling) Islands", "Colombia", "Comoros", "Congo", "Congo, the Democratic Republic of the", "Cook Islands", "Finland", "France", "France Metropolitan", "Kiribati", "Korea, Democratic People's Republic of", "Korea, Republic of", "Kuwait", "Kyrgyzstan", "Lao, People's Democratic Republic", "Latvia", "Lebanon", "Lesotho", "Liberia", "Libyan Arab Jamahiriya", "Liechtenstein", "Lithuania", "Luxembourg", "Macau", "Macedonia, The Former Yugoslav Republic of", "Madagascar", "Malawi", "Malaysia", "Maldives", "Mali", "Malta", "Marshall Islands", "Martinique", "Mauritania", "Mauritius", "Mayotte", "Mexico", "Micronesia, Federated States of", "Moldova, Republic of", "Monaco", "Mongolia", "Montserrat", "Morocco", "Mozambique", "Myanmar", "Namibia", "Nauru", "Nepal", "Netherlands", "Netherlands Antilles", "New Caledonia", "New Zealand", "Nicaragua", "Niger", "Nigeria", "Niue", "Norfolk Island", "Northern Mariana Islands", "Norway", "Oman", "Pakistan", "Palau", "Panama", "Papua New Guinea", "Paraguay", "Peru", "Philippines", "Pitcairn", "Poland", "Portugal", "Puerto Rico", "Qatar", "Reunion", "Romania", "Russian Federation", "San Marino", "Sao Tome and Principe", "Saudi Arabia", "Senegal", "Seychelles", "Sierra Leone", "Singapore", "Slovakia (Slovak Republic)", "Slovenia", "Solomon Islands", "Somalia", "South Africa", "South Georgia and the South Sandwich Islands", "Spain", "Sri Lanka", "St. Helena", "St. Pierre and Miquelon", "Sudan", "Suriname", "Svalbard and Jan Mayen Islands", "Rwanda", "Saint Kitts and Nevis", "Saint Lucia", "Saint Vincent and the Grenadines", "Samoa", "Swaziland", "Sweden", "Switzerland", "Syrian Arab Republic", "Taiwan, Province of China", "Tajikistan", "Tanzania, United Republic of", "Thailand", "Togo", "Tokelau", "Tonga", "Trinidad and Tobago", "Tunisia", "Turkey", "Turkmenistan", "Turks and Caicos Islands", "Tuvalu", "Uganda", "Ukraine", "United Arab Emirates", "United Kingdom", "United States", "United States Minor Outlying Islands", "Uruguay", "Uzbekistan", "Vanuatu", "Venezuela", "Vietnam", "Virgin Islands (British)", "Virgin Islands (U.S.)", "Wallis and Futuna Islands", "Western Sahara", "Yemen", "Yugoslavia", "Guinea-Bissau", "Guyana", "Haiti", "Heard and Mc Donald Islands", "Holy See (Vatican City State)", "Honduras", "Hong Kong", "Hungary", "Iceland", "India", "Indonesia", "Iran (Islamic Republic of)", "Iraq", "Ireland", "Israel", "Italy", "Zambia", "Zimbabwe", "Palestine"};