# CS403/503 Programming Languages
## Spring 2021
Assignment #4

Note: if it asks you to write a program, make sure the program compiles and executes.

1. Write a program in C that uses the `qsort` function to sort an array of real numbers (`double`). Paste below only the comparison function passed to `qsort` as a parameter.

Answer:

```
int compare (const void *a, const void *b) {
  if (*(double *)a > *(double *)b) {
    return 1;
  }
  else {
    return -1;
  }
}
```

2. Problem 5 of Chapter 9 on Page 413

Answer:

- Passed by value

  The value and list always remain same

  Value = 2

  List = {1, 3, 5, 7, 9}

- Passed by reference
  - After first swap
    Value = 1
    List = {2, 3, 5, 7, 9}

  - After second swap
    Value = 1
    List = {3, 2, 5, 7, 9}

- o   After third swap
  Value = 2
  List = {3, 1, 5, 7, 9}

  - Passed by value-result
    - o   After first swap
      Value = 1
      List = {2, 3, 5, 7, 9}

    - o   After second swap
      Value = 1
      List = {3, 2, 5, 7, 9}

    - o   After third swap
      Value = 2
      List = {3, 1, 5, 7, 9}

3. Programming Exercise 8 of Chapter 9 on Page 415

Answer:

```cpp
template <class Type>
int search(Type* array, Type key, int size) {

  for(int index = 0; index < size; index++) {
    if(array[index]== key) {
      return index;
    }
  }
  return -1;
}
```

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4. Problem 2 of Chapter 10 on Page 443

Answer:

| | | |
|---|---|---|
| ARI for c | Parameter (plums) | |
| | Dynamic link | ● |
| | Static link | ● |
| | Return (to b) | |
| ARI for b | Local (z) | |
| | Local (y) | |
| | Parameter (sum) | |
| | Dynamic link | ● |
| | Static link | ● |
| | Return (to a) | |
| ARI for a | Local (x) | |
| | Dynamic link | ● |
| | Static link | ● |
| | Return (to bigsub) | |
| ARI for bigsub | Local (l) | |
| | Local (mysum) | |

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