

# Quiz 24: Sorting SOLUTION

## CSCI 110 Section 1

Friday, November 4, 2016

- 1) Write a function that runs selection sort on a `double[]`. [80 points]

`swap` is a helper function to swap the values at index `a` and index `b` in an array of `double`.

```
void swap(double[] arr, int a, int b) {
    double tmp = arr[a];
    arr[a] = arr[b];
    arr[b] = tmp;
}

void sort(double[] arr) {
    for (int i = 0; i < arr.length; i++) {
        // find the min between i and arr.length - 1
        int min_idx = i;
        double min = arr[i];
        for (int j = i+1; j < arr.length; j++) {
            if (arr[j] < min) {
                min = arr[j];
                min_idx = j;
            }
        }
        // put the min in position i
        swap(arr, i, min_idx);
    }
}
```

Try this solution out here: <https://repl.it/EN5Z/1>

- 2) What's the Big-O runtime of selection sort? [20 points]

We have to go through the entire array and find the min from each element onward. Consider finding the min: for  $i = 0$  we loop through  $n$  elements, for  $i = 1$  we loop through  $n - 1$  elements, and so on. In Big-O,  $n + (n-1) + (n-2) + \dots + 1$  simplifies to  $O(n^2)$ , and that's the runtime for finding the min.

We find the min  $n$  times. So the overall runtime is  **$O(n^2)$** .