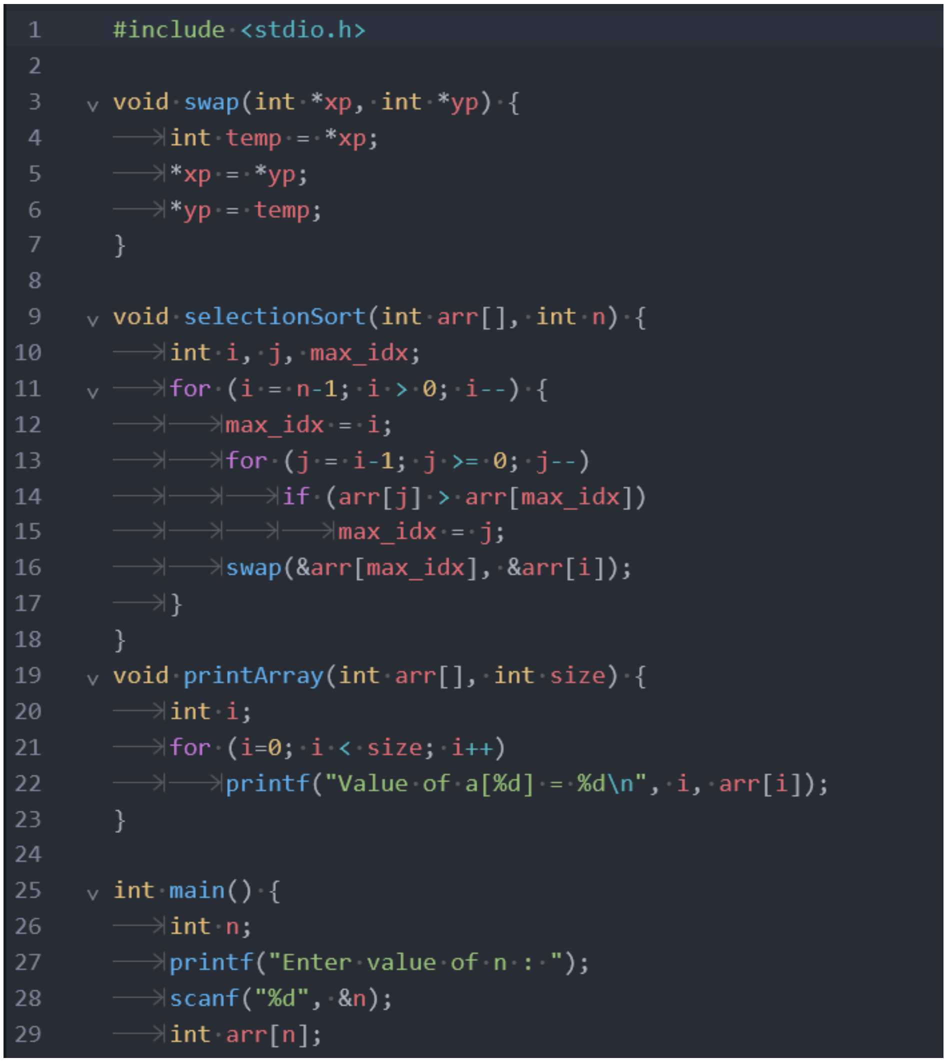
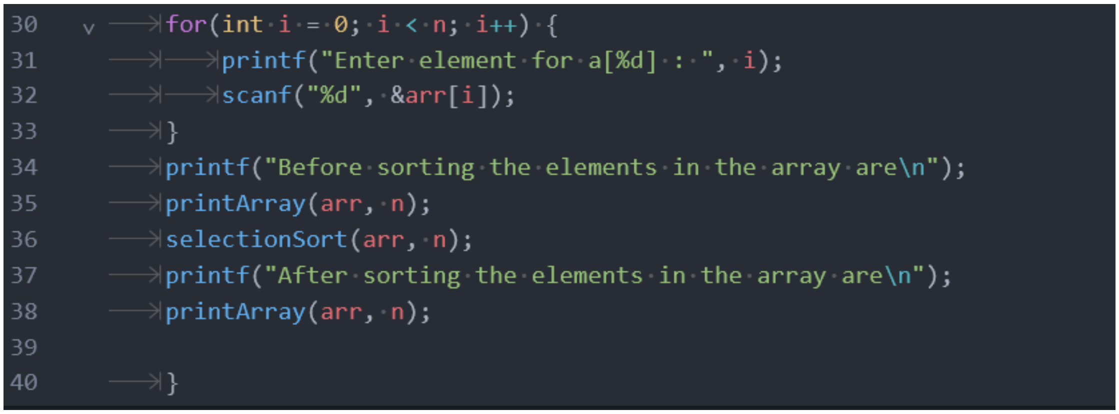
DS Lab 11 Solutions

11.1.1

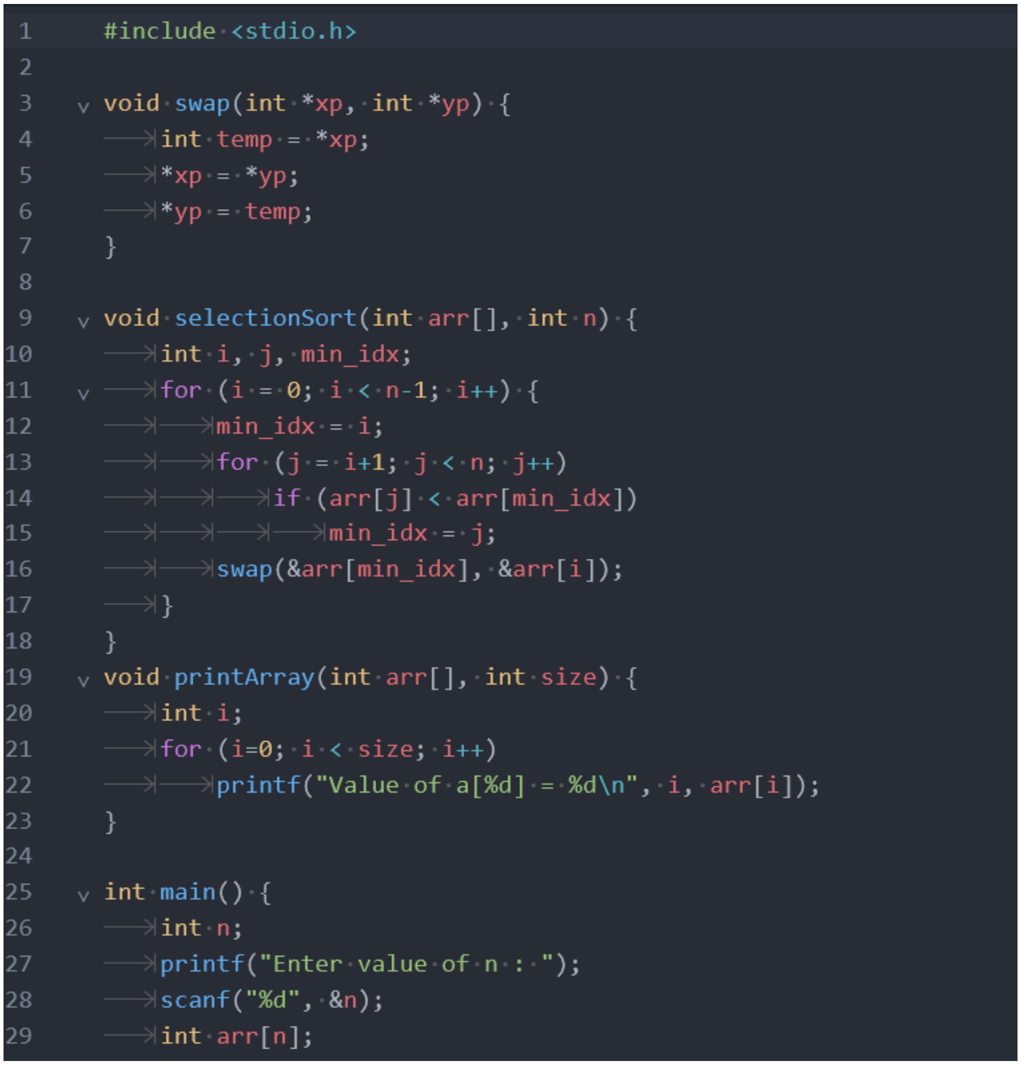


```c
#include <stdio.h>

void swap(int *xp, int *yp) {
	int temp = *xp;
	*xp = *yp;
	*yp = temp;
}

void selectionSort(int arr[], int n) {
	int i, j, max_idx;
	for (i = n-1; i > 0; i--) {
		max_idx = i;
		for (j = i-1; j >= 0; j--)
			if (arr[j] > arr[max_idx])
				max_idx = j;
		swap(&arr[max_idx], &arr[i]);
	}
}
void printArray(int arr[], int size) {
	int i;
	for (i=0; i < size; i++)
		printf("Value of a[%d] = %d\n", i, arr[i]);
}

int main() {
	int n;
	printf("Enter value of n : ");
	scanf("%d", &n);
	int arr[n];
```

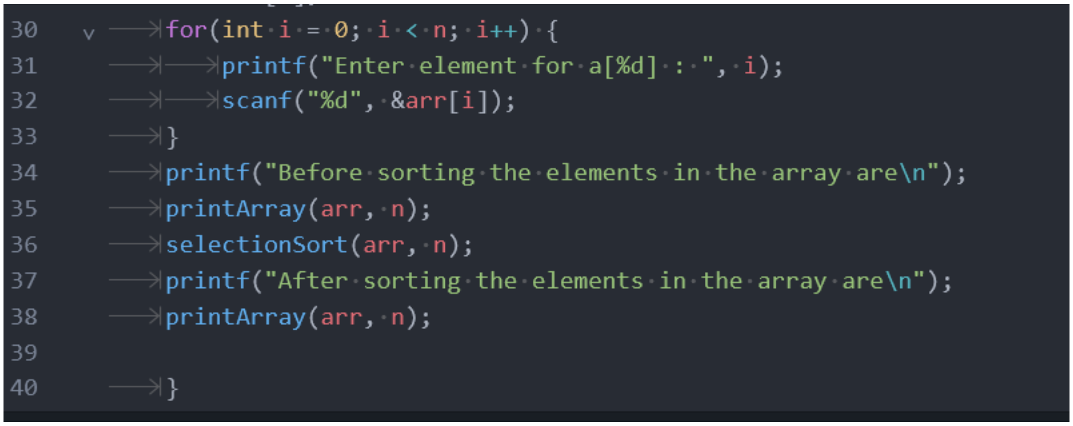


```c
	for(int i = 0; i < n; i++) {
		printf("Enter element for a[%d] : ", i);
		scanf("%d", &arr[i]);
	}
	printf("Before sorting the elements in the array are\n");
	printArray(arr, n);
	selectionSort(arr, n);
	printf("After sorting the elements in the array are\n");
	printArray(arr, n);

	}
```

10.1.2

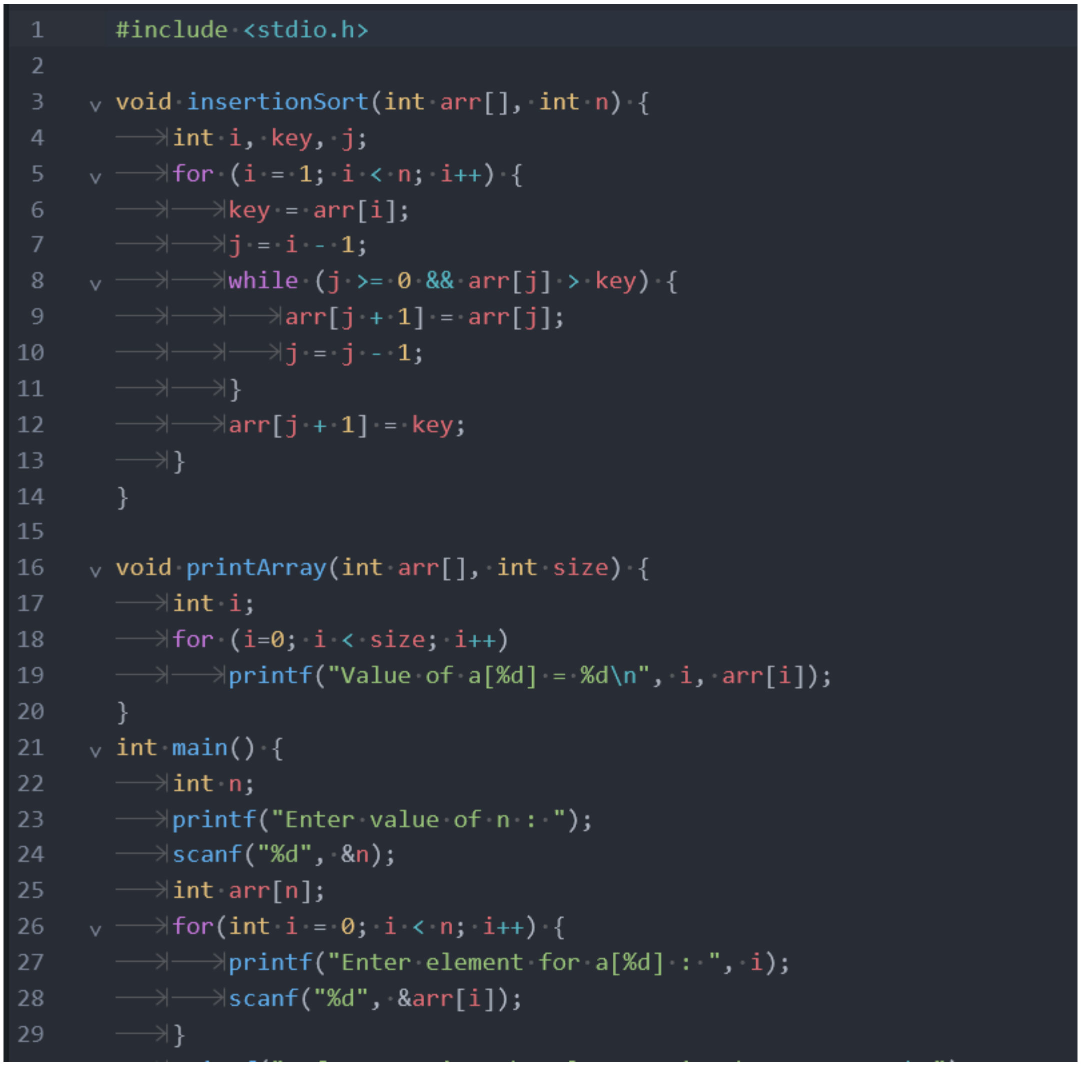


```c
#include <stdio.h>

void swap(int *xp, int *yp) {
    int temp = *xp;
    *xp = *yp;
    *yp = temp;
}

void selectionSort(int arr[], int n) {
    int i, j, min_idx;
    for (i = 0; i < n-1; i++) {
        min_idx = i;
        for (j = i+1; j < n; j++)
            if (arr[j] < arr[min_idx])
                min_idx = j;
        swap(&arr[min_idx], &arr[i]);
    }
}
void printArray(int arr[], int size) {
    int i;
    for (i=0; i < size; i++)
        printf("Value of a[%d] = %d\n", i, arr[i]);
}

int main() {
    int n;
    printf("Enter value of n : ");
    scanf("%d", &n);
    int arr[n];
```

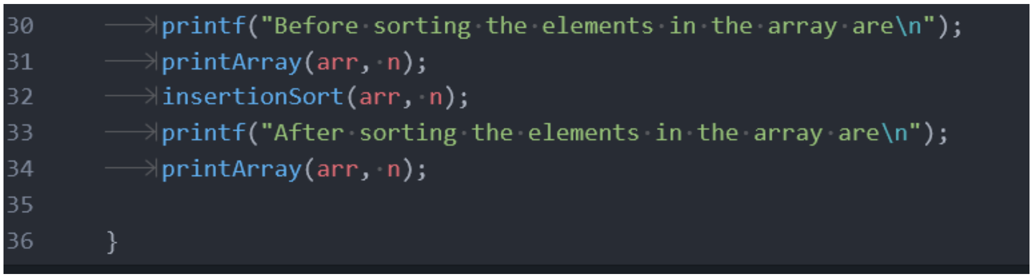


```c
    for(int i = 0; i < n; i++) {
        printf("Enter element for a[%d] : ", i);
        scanf("%d", &arr[i]);
    }
    printf("Before sorting the elements in the array are\n");
    printArray(arr, n);
    selectionSort(arr, n);
    printf("After sorting the elements in the array are\n");
    printArray(arr, n);

    }
```

11.1.3

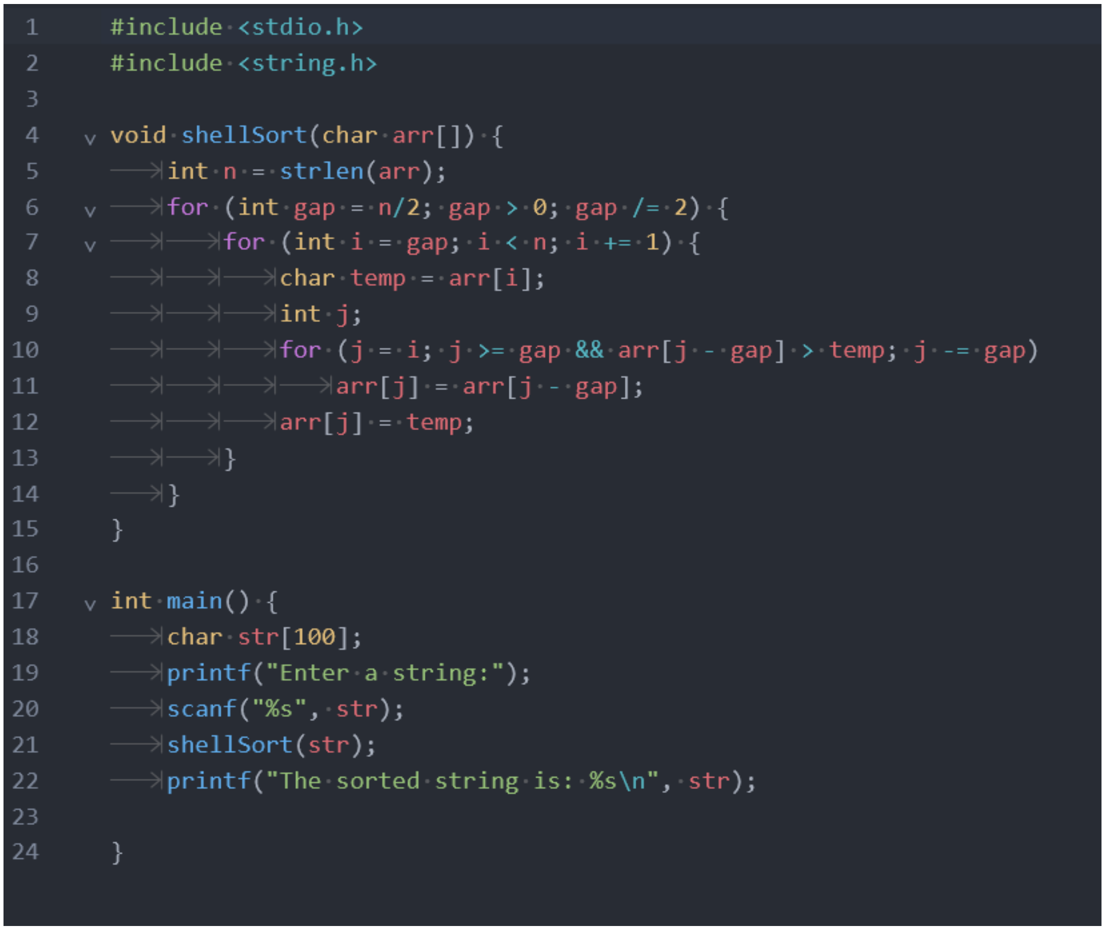


```c
#include <stdio.h>

void insertionSort(int arr[], int n) {
    int i, key, j;
    for (i = 1; i < n; i++) {
        key = arr[i];
        j = i - 1;
        while (j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
            j = j - 1;
        }
        arr[j + 1] = key;
    }
}

void printArray(int arr[], int size) {
    int i;
    for (i=0; i < size; i++)
        printf("Value of a[%d] = %d\n", i, arr[i]);
}
int main() {
    int n;
    printf("Enter value of n : ");
    scanf("%d", &n);
    int arr[n];
    for(int i = 0; i < n; i++) {
        printf("Enter element for a[%d] : ", i);
        scanf("%d", &arr[i]);
    }
```



```c
    printf("Before sorting the elements in the array are\n");
    printArray(arr, n);
    insertionSort(arr, n);
    printf("After sorting the elements in the array are\n");
    printArray(arr, n);

}
```

11.2.1



```c
#include <stdio.h>
#include <string.h>

void shellSort(char arr[]) {
    int n = strlen(arr);
    for (int gap = n/2; gap > 0; gap /= 2) {
        for (int i = gap; i < n; i += 1) {
            char temp = arr[i];
            int j;
            for (j = i; j >= gap && arr[j - gap] > temp; j -= gap)
                arr[j] = arr[j - gap];
            arr[j] = temp;
        }
    }
}

int main() {
    char str[100];
    printf("Enter a string:");
    scanf("%s", str);
    shellSort(str);
    printf("The sorted string is: %s\n", str);

}
```