Tutorial 7

- Arrays.
- Pointer arithmetic.
- Abstract Data Types (ADT).
Arrays

They can be used to store a fixed number of elements of the same type.

Example of array syntax:

```c
int my_array[3] = { 1, 2, 3 };  // my_array = [1, 2, 3]
int x = my_array[0];          // x = 1
```
Array Initialization

There are several ways to define an array:

```c
int a[3]; // array is not initialized, but it's defined
int b[3] = { 1, 2, 3 }; // array is initialized
int d[3] = {0}; // array of length 3, filled with zeros
int e[8] = { 7, 4, 1 }; // {7, 4, 1, 0, 0, 0, 0, 0}
Array Exercise

// reverse_array(arr, len) reverses the contents of arr
// requires: arr is an array with length (at least) len
// effects: modifies arr
void reverse_array(int arr[], int len);
Pointer Arithmetic

Certain arithmetic operations can be performed on pointers. An integer can be added or subtracted to a pointer, and pointers of the same type can be subtracted from one another.

```c
int a[10];
int *p = a;       // a is a pointer to first element
int *q = &a[9];  // address of 10th element
q = a + 9;       // equivalent
a[2] = q - p;    // set the value of 3rd element as 9
q = p + 1;       // now q == &a[1]
```

Addition of pointers is not allowed.
Array Exercise 2

Write Reverse again, now using pointer arithmetic
(hint, this code will be essentially identical to reverse)

```
// reverse_array(arr, len) reverses the contents of arr
// requires: arr is an array with length (at least) len
// effects: modifies arr
void reverse_array(int *arr, int len);
```

The syntax `a[i]` is shorthand for the equivalent expression `*(a+i)`.
ADT Exercise

Write the following program using Stack as an ADT

```plaintext
// Read in integers from input and print
// them in reverse order WITHOUT using recursion
```