# CS 161
# Intro to CS I

Continue 1-d Arrays, C-Strings, and Command-Line Arguments

OSU Oregon State University

# Odds and Ends

- Demo Assignment 4
- Assignment 5 posted
- Veteran's Day Friday (no class/office hours)

```cpp
#include <iostream>
using namespace std;

int main() {
    int stack_array[10];
    int *heap_array=new int[10];

    //how do I initialize the elements in array
    stack_array[0]=10;
    heap_array[0]=100;
    //how do I print the address of the pointer to the array
    cout << &stack_array << endl;
    cout << &heap_array << endl;
    //what is the contents of the pointer, how do I print it
    cout << stack_array << endl; //address of where array is
    cout << heap_array << endl;
    //how do I print the address of where the array begins in memory
    cout << &(stack_array[0]) << endl; //address of where array is
    cout << &(heap_array[0]) << endl;
    //how do I print the contents of the first element in the array
    cout << *(stack_array+0) << endl; //contents of first element
    cout << heap_array[0] << endl;  //[] is adress arithmetic and deref

    return 0;
}
```
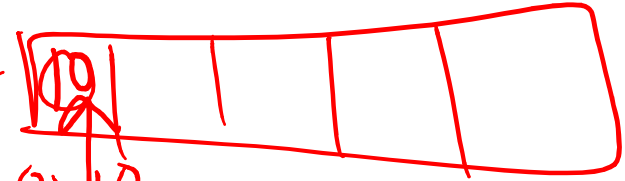
19,36                All

# Passing a 1-D Array (Static/Dynamic)

```cpp
int main() {
  int array[5];

  ...

  pass_1darray(array);

  ...

}
void pass_1darray(int *a) {
  cout << "Array at zero: " << a[0] << endl;
}
```
**OR**
```cpp
void pass_1darray(int a[]) {
  cout << "Array at zero: " << a[0] << endl;
}
```

*(handwritten annotations):*

vs. int *array = new int [5];

0x10

0x10

dyn. 0x10 array
sta 0x10 array

a[0] = 10;

0x10

0x10

a

4

# Class Exercise

- How would I do the above in a function?
- How would I create an array in a function?

```cpp
 1 #include <iostream>
 2 using namespace std;
 3
 4 //return address of array on heap
 5 int * fun() {
 6     //int stack_array[10]; //never return stack address from function
 7     //return stack_array;   //BAAAAAAAAD!!!!
 8     return new int[10];
 9 }
10
11 //pass pointer to function as reference, a is a reference to an int *
12 void fun(int *&a) {
13     a=new int[10];   //a really refers to heap_array
14 }
15
16 //pass address of pointer to int, which makes int **
17 void fun(int **a) {
18     *a=new int[10]; //dereference a to get to heap_array contents
19 }
20
21 int main() {
22     int stack_array[10];
23     int *heap_array=NULL;
24
```

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```cpp
19 }
20
21 int main() {
22     int stack_array[10];
23     int *heap_array=NULL;   //make pointer on stack to point to array on heap
24
25     //heap_array=fun();   //return addres on array on heap to heap_array
26
27     //fun(heap_array);    //pass heap_array by reference
28     //cout << heap_array << endl;
29
30     fun(&heap_array);    //pass address of heap_array explicitly, int ** passed
31     cout << heap_array << endl;
32
33     //how do I initialize the elements in array
34     stack_array[0]=10;
35     heap_array[0]=100;
36     //how do I print the address of the pointer to the array
37     cout << &stack_array << endl;
38     cout << &heap_array << endl;
39     //what is the contents of the pointer, how do I print it
40     cout << stack_array << endl; //address of where array is
41     cout << heap_array << endl;
42     //how do I print the address of where the array begins in memory
```

# What are C-style strings?

- Ended by '\0' character
- Need to include <cstring>

char s[5];  //can only hold 4 characters plus '\0'
cin >> s;  //you should only enter 4 chars!!!!