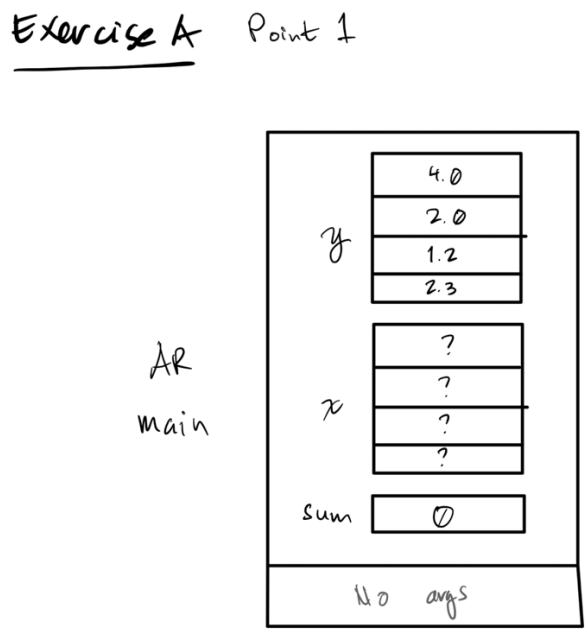
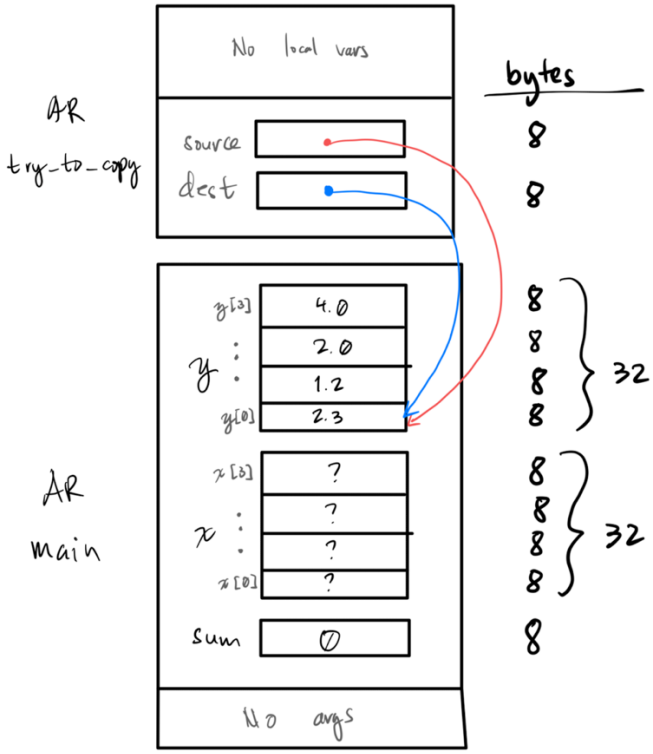
Course: ENSF 614 - Fall 2023
Lab #: Lab 2
Instructor: Mahmood Moussavi
Student Names: Redge Santillan,
Christian Valdez
Submission Date: September 27, 2023

Exercise A

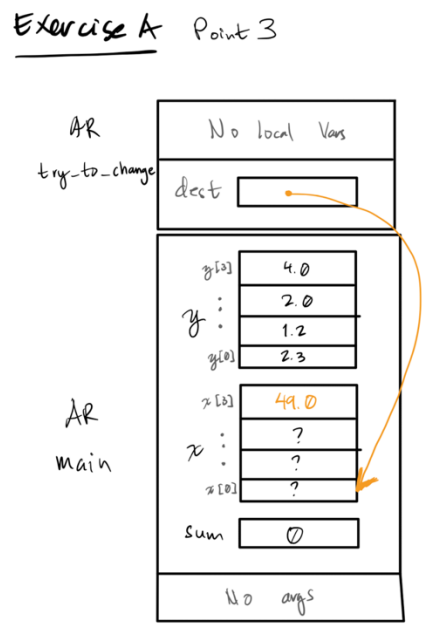
Point 1



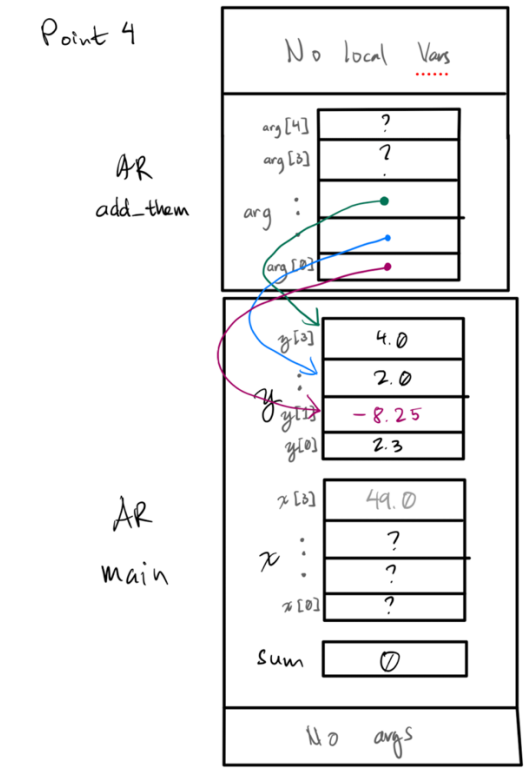
Point 2



Point 3



Point 4



Exercise B

my_lab2exe_B.cpp source file:

```
/*
 *  File Name: my_lab2exe_B.cpp
 *  Assignment: Lab 2 Exercise B
 *  Completed by: Redge Santillan
 *  Submission Date: Sept 27, 2023
 */

int my_strlen(const char *s);
/*  Duplicates strlen from <cstring>, except return type is int.
 *  REQUIRES
 *    s points to the beginning of a string.
 *  PROMISES
 *    Returns the number of chars in the string, not including the
 *    terminating null.
 */

void my_strncat(char *dest, const char *source, int n);
/*  Duplicates strncat from <cstring>, except return type is void.
 *  REQUIRES
 *     dest points to the beginning of a string
 *     source points to the beginning of a string
 *     n - integer, first n number of characters to copy from source to dest.
 *  PROMISES
 *     Appends the dest c-string with the first n characters of source c-string.
 */

int my_strcmp(const char *str1, const char *str2);
/*  Compares string1 and string2
 *  REQUIRES
 *     str1 points to the beginning of a string
 *     str2 points to the beginning of a string
 *  PROMISES
 *     Returns 0 if str1 and str2 are identical.
 *     Returns a positive integer if str1 > str2.
 *     Returns a negative integer if str1 < str2.
 */

#include <iostream>
#include <cstring>
using namespace std;

int main(void)
{
   char str1[7] = "banana";
   const char str2[] = "-tacit";
   const char* str3 = "-toe";
```

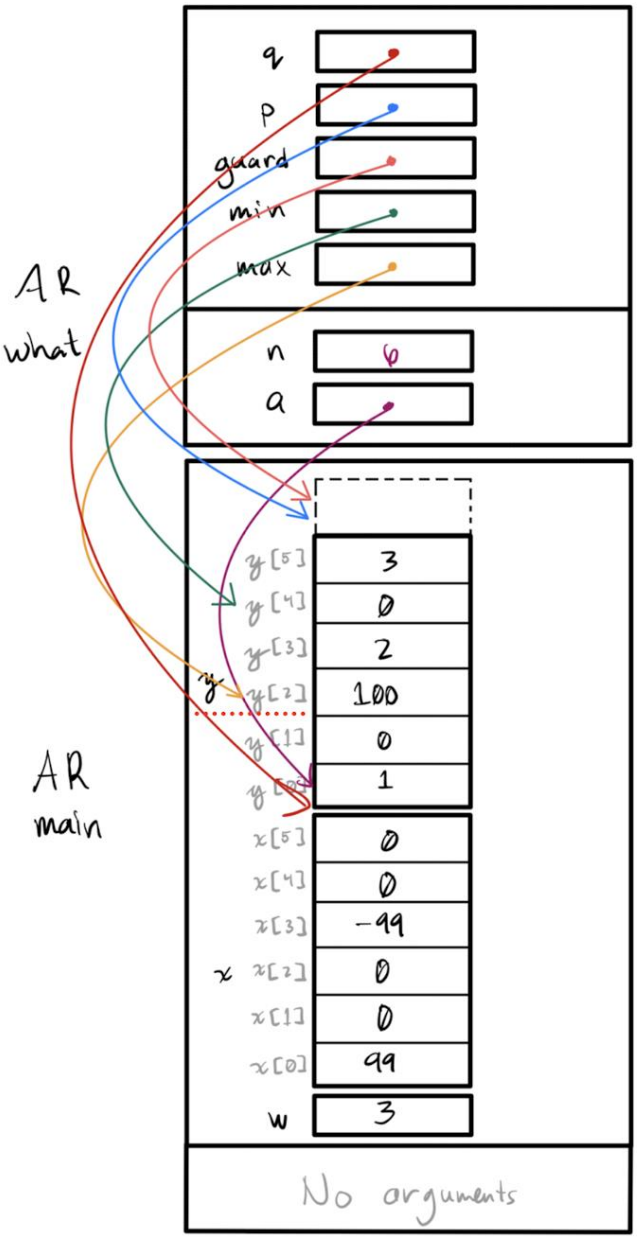
```
/* point 1 */
char str5[] = "ticket";
char my_string[100]="";
int bytes;
int length;

/* using strlen libarary function */
length = (int) my_strlen(my_string);
cout << "\nLine 1: my_string length is " << length;

/* using sizeof operator */
bytes = sizeof (my_string);
cout << "\nLine 2: my_string size is " << bytes << " bytes.";

/* using strcpy libarary function */
strcpy(my_string, str1);
cout << "\nLine 3: my_string contains: " << my_string;

length = (int) my_strlen(my_string);
cout << "\nLine 4: my_string length is " << length << ".";

my_string[0] = '\0';
cout << "\nLine 5: my_string contains:\"" << my_string << "\"";

length = (int) my_strlen(my_string);
cout << "\nLine 6: my_string length is " <<  length << ".";

bytes = sizeof (my_string);
cout << "\nLine 7: my_string size is still " << bytes << " bytes.";

/* strncat append the first 3 characters of str5 to the end of my_string */
my_strncat(my_string, str5, 3);
cout << "\nLine 8: my_string contains:\"" << my_string << "\"";

length = (int) my_strlen(my_string);
cout << "\nLine 9: my_string length is " << length << ".";

strncat(my_string, str2,  4);
cout << "\nLine 10: my_string contains:\"" << my_string << "\"";

/* strncat append ONLY up ot '\0' character from str3 -- not 6 characters */
my_strncat(my_string, str3, 6);
cout << "\nLine 11: my_string contains:\"" << my_string << "\"";

length = (int) my_strlen(my_string);
cout << "\nLine 12; my_string has " << length << " characters.";

cout << "\n\nUsing strcmp - C library function: ";

cout << "\n\"ABCD\" is less than \"ABCDE\" ... strcmp returns: " <<
```

```
    my_strcmp("ABCD", "ABCDE");

    cout << "\n\"ABCD\" is less than \"ABND\" ... strcmp returns: " <<
    my_strcmp("ABCD", "ABND");

    cout << "\n\"ABCD\" is equal than \"ABCD\" ... strcmp returns: " <<
    my_strcmp("ABCD", "ABCD");

    cout << "\n\"ABCD\" is less than \"ABCd\" ... strcmp returns: " <<
    my_strcmp("ABCD", "ABCd");

    cout << "\n\"Orange\" is greater than \"Apple\" ... strcmp returns: " <<
    my_strcmp("Orange", "Apple") << endl;
    return 0;
}

/*  Duplicates strlen from <cstring>, except return type is int.
 *  Counts the number of non-'\0' characters in a char array.
 *  Returns the number of non-'\0' characters in a char array.
 */
int my_strlen(const char *s){
    bool endOfArray = false;
    int counter = 0;
    while (!endOfArray) {
        if (s[counter] == '\0'){
            endOfArray = true;
        } else {
            counter++;
        }
    }
    return counter;
}

/*  Appends the first n characters of string source to string dest, and returns a char* to dest. If the length of the
C-string in source is less than n, only the content up to the terminating null character '\0' is copied.
 */
void my_strncat(char *dest, const char *source, int n){
    // If given n > strlen(source), only copy strlen(source)
    int sourceLength = my_strlen(source);
    int destLength = my_strlen(dest);
    if (n > sourceLength){
        n = sourceLength;
    }
    // Look for the first '\0' in dest - this will be n + 1. Loop thru
    for (int i = 0; i < n; i++){
        dest[i + destLength] = source[i];
    }
    dest[n + destLength] = '\0';
}
```

```c
/** Compares 2 c-strings.
   Returns 0 if str1 and str2 are identical.
   Returns a positive integer if str1 > str2.
   Returns a negative integer if str1 < str2.
 **/
int my_strcmp(const char *str1, const char *str2){
   // as soon as you find the difference until you subtract - don't need the lengths.
   int result = 0;

   // The while condition ensures that as soon as str1 and str2 are pointing to values that are NOT the same,
the program will exit the loop
   // Check if str1 is pointing to a '\0' value to ensure that neither pointers will point to inaccessible memory
   while ((*str1 == *str2) && *str1 != '\0') {
         str1++;
         str2++;
   }

   result = *str1 - *str2;

   return result;
}
```

Exercise C

Point 1 – second function call



Exercise E

```
/*
 * lab2exe_E.cpp
 * Implementation file for complex number module
 * Assignment: Lab 2 Exercise E
 * Section: B01
 * Completed by: Christian Valdez and Redge Santillan
 * Submission date: Sep 27, 2023
 */

#include "lab2exe_E.h"

cplx cplx_add(cplx z1, cplx z2) {
	cplx result;
	result.real = z1.real + z2.real;
	result.imag = z1.imag + z2.imag;
	return result;
}

void cplx_subtract(cplx z1, cplx z2, cplx* difference) {
	difference->real = z1.real - z2.real;
	difference->imag = z1.imag - z2.imag;
}

void cplx_multiply(const cplx* z1, const cplx* z2, cplx* difference) {
	difference->real = (z1->real * z2->real) - (z1->imag * z2->imag);
	difference->imag = (z1->real * z2->imag) + (z1->imag * z2->real);
}
```