CST8234 – C Programming
Sample Questions Midterm I
Name:_____

Question **[20 Points - 2 Points each]**

Write a C statement or a set of statements to accomplish each of the following:

1. Read three integers from the keyboard and store them in the variables `x, y` and `z`

2. Calculate the reminder after `q` is divided by `divisor` and assign the result to `q`.

3. Sum the odd integers between `1` and 99 using a **`for`** statement. Assume the variables `sum` and `i` have been defined.

4. Display the value of the 7th element of a character array `f`.

5. Total the number of elements of a floating point array `c` of `100` elements.

6. Write a function prototype for a function `exchange()` that takes two pointers to floating point numbers `x, y` as parameter and does not return any values.

7. Read an integer `n` from the keyboard or a file until end-of-file is read, then print how many entries it read.

8. Assume:
```
int array[100];
int *p;
```
Assign the starting address of the array to the pointer p.

Name:_____

9.

Dynamically allocate in the heap, 100 integer memory space and initialize a pointer to the first memory location.

10.

Define a symbolic constant YES to have a value of 1

Question **[20 Points]**

Assume you have written the following program `largest.c`:

```
 1 #include <stdio.h>
 2
 3 int main( void ) {
 4
 5         int i = 0,
 6             num,
 7             largest;
 8
 9         while ( fscanf(stdin, "%d", &num) != EOF ) {
10                 if ( i == 0 ) largest = num;
11                 if ( number > largest )
12                         largest = num;
13                 i++;
14         }
15         Fprintf( stdout, "Largest %d of %d numbers\n", largest, i );
16
17         return 0;
18 }
```

How would you compile this program in a Linux machine? [2 Points]

What will be the name of your executable: [2 Points]

Clearly explain the phases that a C program needs to go through to be executed. It may be easier to explain using a diagram. Identify each phase, indicating what happens in each stage. [6 Points]

After attempting compilation, you get the following error message:

```
largest.c: In function ‘main’:
largest.c:11: error: ‘number’ undeclared (first use in this function)
```

What is this error indicating? From which phase is error is coming ? Fix the error. [3 Points]

Assume the above error has been fixed. After attempting compilation, you get the following error message:

```
/tmp/ccQTtFkz.o: In function `main':
largest.c:(.text+0x6f): undefined reference to `Fprintf'
collect2: ld returned 1 exit status
```

What is this error indicating? From which phase is error is coming ? Fix the error. [3 Points]

Assume the above error has been fixed. You program has successfully compiled. How many numbers will your program read? Explain your answer. [2 Points]

Modify the `largest.c` program to read the values from a file instead of the keyboard. Clearly explain the modifications you'll do – if any – and the way you will run your program. [2 Points]

Question **[20 Points]**

Given the following variables declarations. Assumption:

SIZE has been defined as 5
integer is stored in 4 bytes
char is stored in 1 byte
ASCII value of A is 65
starting address of the array is 1002500

```
int num = 78;
int *p;
int array[SIZE] = { 0, 1, 2, 3, 4 };
char c[SIZE]    = {'A', 'B', 'C', 'D', 'E'};
```

Create a memory map, for the above variables, indicate initial values for each of them [6 Points]

Name:_____

```
p  = array[3];
*p = (int) *c;
```

Create a memory map, for the above code, indicate values for each of them [4 Points]

```
p++;
array[4] = num;
p++;
```

Create a memory map, for the above code, indicate values for each of them [6 Points]

```
p = c;
p++;
```

Create a memory map, for the above code, indicate values for each of them – indicate any abnormal behaviour [4 Points]

CST8234 – C Programming
Sample Questions Midterm I
Name:_____

Section V **[20 Points]**

Assume you have the following functions (you can use them, no need to write them).

```
/*************************************************************************/
/* Initialize array  a of size s with random numbers
/* a:  array passed by reference
/* s:  integer passed by value
 *************************************************************************/
int init_array( int * a, int s );

/*************************************************************************/
/* Prints an array a of size s
/* a:  array passed by reference
/* s:  integer passed by value
 *************************************************************************/
int print_array( int *a, int s );
```

Write a small function in C-like code `search_array()` to search for a number `n` in an array `a`. `search_array()` should return the number of times that `n` was found. Your function should not do any printing. In the function header, indicate which arguments are passed by value and which are passed by reference. [5 Points]

CST8234 – C Programming
Sample Questions Midterm I
Name:_____

Write a small function in C-like code `min_max_array()` to find the minimum and maximum numbers in an array `a`. `min_max_array()` should return nothing. Your function should not do any printing. In the function header, indicate which arguments are passed by value and which are passed by reference. [5 Points]

Write a C-like program to do the following – please notice that you may need to use more variables that the ones stated here [10 Points]

1. Declare a pointer to an integer
2. Allocate memory in the heap for an integer array of size N
3. Assign the new memory allocated to the pointer-based
4. Find the size of the array
5. Initialized the array with random numbers
6. Ask the user for a number
7. Indicate to the user if the number is part of the array
8. Find the minimum and maximum numbers in the array – print them
9. Print the array

[Use the next page to write your code -- Please notice that marks in the question are independent of what your functions are correct or not.]

Name:_____