CIS 241 Winter 2018
Homework 1

Due: Monday, 2/26/2018, by 10:00 pm

1. Given a C source code file "test.c", please give the command to generate an executable named "test". Assume the compiler gcc is used to compile the program. (5 points)

2. Please complete the following equations in the context of C programming language. (5 points)

    a. 3/2=?

    b. 5/2.0=?

3. Please list five keywords reserved in C and briefly explain their meanings. (5 points)

4. Which header file is required to use the functions of "printf()" and "scanf()"? (5 points)

5. Please indicate whether the following statements with a question mark are allowed or not allowed in ANSI C programs. If not allowed, please explain why (5 points).

    a. int a[10];
            a++; ?

    b. int a[10];
            int *p = a;
            p++; ?

    c. #define N 10
            int a[N]; ?

6. What are the outputs when the following code gets executed? Please study the code and understand why those values get printed. (5 points)

    ```
    char *formant = "\n%d\n%d\n%d\n%d\n";
    int a[] = {3, 6, 8};
    int *p = a;
    printf(format, *(p+1), *p + 7, 3 * **&p + 1, 2 * *(p + 1) – 2);
    ```

7. What get printed when the following code is executed (5 points)? Please study the code to understand the outputs.

```
char str[] = "system", *p;
p = str;
printf("\n%c %s %s %d %d\n", *p, str, p + 1, strlen(str), sizeof(str));
```

8. What are the differences between variable n and static variable m in the function below in terms of life time and initialization (5 points)?

```
void foo ( )
{
    int n = 3;
    static int m = 6;

    … …
}
```

9. What is a union and when would you want to use it in a C program (5 points)?

10. What is the purpose of using the built-in function *free()* in a C program? What types of pointers can be passed in to the function? (5 points)

11. (15 points) Answer the following questions based on the following code.

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

void swap(int *a, int *b)
{
    int *tmp = a;
    a = b;
    b = tmp;
}

int main()
{
    int a = 6, b = 8;
    printf("Before swap: a = %d, b = %d\n", a, b);
    swap(&a, &b);
    printf("After  swap: a = %d, b = %d\n", a, b);

    return 0;
}
```

1) What gets printed out when the code is executed?

2) The swap function is intended to swap the two passed in variables. Does it work as expected? If not, why?

3) How can you modify the swap function to make it work as expected?

12. (15 points) Given the definition of a structure below, complete the following function definitions

```
typedef struct {
   int num;
   char code[10];
}ITEM;

//set member num of item to 0 and code to an empty string
void initialize (ITEM * item)
{




}

//print out the data in item on the screen
void display (ITEM item)
{




}

//store s in code of item and its length in num
void set (ITEM *item, char s[]);
{




}
```

13. (10 points) What are the differences between stack and heap in terms of memory management, more specifically, in terms of memory allocation and release?

14. (10 points) Describe an example where using pointer variables are faster with less memory need than using arrays.