Lab 5 (Week 6): Reviewing Exam 1

The following functions may be used (and might be useful) in this exam (or practice):

stdio.h	int putchar(int c);	write a character to standard output
stdio.h	int getchar(void);	read a character from standard input
stdio.h	char *fgets(char *s, int size, FILE *stream);	read a line from stream into s. return NULL on EOF
ctype.h	int toupper(char c); int tolower(char c);	return upper case / lower case of the passed char.
stdlib.h	int rand(void);	returns a pseudo-random integer in the range 0 to RAND_MAX

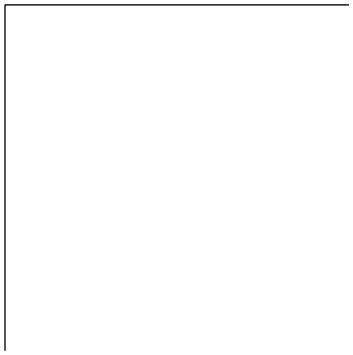
You may also use any other function defined in stdio.h, stdlib.h, ctype.h and string.h, except as noted in particular questions.

1. What does the following program print? Enter and run the program and write down the result. (First try this by hand)

```
#include <stdio.h>

int main(void) {

   int x = 2;

   x *= 3 + 2;
   printf("%d\n", x);

   x = -3 + 4 * 5 – 6;
   printf("%d\n", x);

   x = 3 + 4 % 5 – 6;
   printf("%d\n", x);

   x = -3 * 4 % -6 / 5;
   printf("%d\n", x);

   x = (7 + 6) % 5 / 2;
   printf("%d\n", x);

   return 0;

} // main()
```

2. What does the following program print? Enter and run the program and write down the result. (first try this by hand)

```
#include <stdio.h>

int main(void) {

   int x = y = z = 1;

   x += y += z;
   printf("%d\n",  (x < y ? y : x) );

   printf("%d\n", (x < y ? x++ : y++) );
   printf("%d\n", x);
   printf("%d\n", y);

   x = 3; y = z = 4;
   printf("%d\n", (z >= y >= x) ? 1 : 0) );

   return 0;

} // main()
```



3. Write a **complete C** program, called **letters**, that inputs a stream of text (one character at a time) from standard input and counts the frequency of occurrence of the letters **A** (or **a**) through **Z** (or **z**).After compiling the program might be called using:

a.out < aasdfgfdsdfgfdsa asdfghagfsdg agsfdred hagafdsrew

4. Write a **complete C program** that simulates the rolling of a die (outcomes **[1..6]**) **n** times (where n is given as a command line argument) and records the number of occurrences of each outcome. From this data, the program should compute and print the empirical probability of getting an outcome of **3**. For example, if **n = 10** and the outcomes are:

```
5  1  4  5  3  3  2  6  1  4
```

The empirical probability of getting a 3, based on the above is **0.20** (up to two decimal places).

5. Complete the definition of the **C function** below and test it in a program. It determines the largest elements in each row and places them in an array. For example,

```
int data[4][4] = { {1, 5, 3, 2},
                   {4, 6, 1, 3},
                   {9, 2, 6, 7},
                   {5, 8, 3, 4} };

int rMax[4];
```

After the call:

```
maxRow(4, data, rMax);
```

We will have:

```
rMax = [5, 6, 9, 8]
```

Here is the function definition you have to complete:

```
void maxRow(int n, int A[n][n], int rm[n]) {

   // determines the max element in each row of A[][] and places it in
rm[].
```

6.**What is the output of the following C program**

```
int main(void) {
int data[4][4] = { {1, 5, 3, 2},
                   {4, 6, 1, 3},
                   {9, 2, 6, 7},
                   {5, 8, 3, 4} };
printf("%d\n", data[1][2]);
printf("%d\n", *(data[1]));
int* d = data[2];
printf("%d\n", *(d++));
printf("%d", *d);
}
```

6 What is the output of the following C program

```
int main(void) {
int* a;
int b = 5;
a = &b;
*a=10;
printf("%d %d"\n",b, a);
}
```

7. Write a function "void printString(char * str)" that prints a string using putc.

8. The following two expressions are equivalent. What do they do? Why is the second expression preferred to the first?

```
while ((c=getchar()) == 'a');

while ('a' == (c=getchar()));
```