Midterm Exam #1 Example Problems

1. Given the following variables, evaluate each C statement and write its answer.

Note: use 1 for True, 0 for False

```
int x = 5, y = 15, z = 22;
int result;
```

result = (x < y) && !(x > z); result = 1

result = (x > y) || (x > z); result = 0

result = z%4 + y/4; result = 5

2. Given the followings, what get printed?

```
#include <stdio.h>
int main(void){
        int x = 1;
        if (x >= 0)
                x = 2*x;
        else if (x >= 2)
                x = 4*x;

        printf("x = %d\n", x);
        return 0;
}
```

Your answer: x = 2

```
#include <stdio.h>
int main(void){
        int y = 1;
        if (y >= 0)
                y = 2*y;
        if (y >= 2)
                y = 4*y;

        printf("y = %d\n", y);
        return 0;
}
```

Your answer: ~~y = 2~~

y = 8

3. Given part of a program, answer the following 4 questions:

```
int x;
for(x =10; x > 0; x = x - 3)
 {
        printf("$");
 }
 printf("x value = %d", x);
```

3a) How many "$" will get printed? 4

3b) What is the value of x at the last printf statement?

x value = -2

3c) Which for loop given below will print **3** dollar signs ($)? (circle one answer)

a) for(x = 0; x < 5; x = x + 3)

b) for(x = 1; x < 5 ; x = x * 2)

c) for(x = 0; x != 5; ++x)

d) for(x = 100; x < 105; x = x - 1)

e) None of the above

3d) Rewrite the *for* loop below using **while** loop

```
int x;
for(x =10; x > 0; x = x - 3)
{
        printf("$");
}
```

```
int x;
x = 10;
while (x > 0) {
printf("$"):
 x = x -3;
}
```

4. What will get printed by the following program?

```
#include<stdio.h>
void  do_func(int x, int y){
     y = (x%2 == 0);
     x = x/2+1;
}
int main(void){
        int x = 20,y = 9;
        do_func(x, y);
        printf("x = %d and y = %d\n", x, y);
        return 0;
}
```

Write your answer here

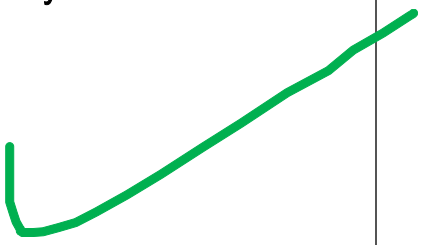
x = 20 and y = 9

5. What will get printed by the following program?

```
#include<stdio.h>
int do_func(int x, int y){
     y = (x%2 == 0);
     x = x/2+1;
     return(x);
}
int main(void){
        int x = 20,y = 9;
        x = do_func(x, y);
        y = do_func(100, y);
        printf("x = %d and y = %d\n", x, y);
        return 0;
}
```

Write your answer here

x = 11 and y = 51



6. Given the program below, answer the questions below.

```
#include <stdio.h>
int main(void){
     char  letter;
     printf("Enter a character:  ");
     scanf("%c", &letter);
     if (letter >= 'a' && letter <= 'z')
             printf("%c%c\n", letter, letter - 32);
     else if (letter >= 'A' && letter <= 'Z')
             printf("%c%c\n", letter, letter + 32);
     else
             printf("%c\n", letter);
     return(0);
}
```

a) What get printed if a user enters g (letter = 'g')?

gG

b) What get printed if a user enters $ (letter = '$')?

$

7. Given the following program, what will get printed?

```
#include <stdio.h>
int main(void)
{
        int i, j, n = 5;
        char a = 'A';
        for (i = 1; i <= n; i++)
        {
                printf("B");
                if (i == n){
                        a = 'B';
                }
                for (j = 2; j < i; j++){
                        printf("%c", a);
                }
                if (i != 1){
                        printf("B");
                }
                printf("\n");
        }
return 0;
}
```

Write your answer here

B
BB
BAB
BAAB
BBAAAB

i =5 : BBBBB

8. What is the output of this code segment?

```
for  (k = 5;  k > 0;  k = k - 1) {
    for  (i = 1; i <= 5 - k;  i++)
       printf(".");
    for  (j = 1;  j <= 2 * k - 1;  j = j + 1)
       printf("B");
    printf("\n");
 }
```

Write your answer:

BBBBBBBBB
.BBBBBBB
..BBBBB
...BBB
....B

BBBBBBBBB
.BBBBBBB
..BBBBB
...BBB
....B

9. Complete the given incomplete program below such that it yields the output shown in the box on your right-hand side.

The output from the code:

```
A1 A2 A3 A4 A5
B1 B2 B3 B4
C1 C2 C3
D1 D2
E1
```

```
#include <stdio.h>
int main(void){
      char letter;
      //declare variables here
  int i = 0;
  int num = 5 ;

      for (letter = 'A'; letter <= 'E'; letter++){
            //write your code (hint: loop should be used)

              for (I = 0; I < num; i++ )
            {
            printf("%c", letter);
            printf("%d ", I);
            }
             num = num - 1;

            printf("\n");
      } //for
      return 0;
}
```

10. Write a C **user-defined function** that
accepts three input arguments: real-valued a, b and angle d (in degrees) and returns value of c from

$$c = \sqrt{a^2 + b^2 - 2abcos(d)}$$

Note: double or float should be used.

```
double cos_rule (double a, double b, int d)
{
 double c = 0;
 c = pow(a, 2) + pow(b,2);
 c = c - (2 * a * b * cos(d));
 c = sqrt(c);

return c;
}
```

```
  double const pi = 3.14159;
  double d_rad;

  d_rad = d * pi / 180
```

11) What are the values of R, L, and J when the program ends? Write the values of R, L, and J next to each line of code to receive partial credit!

```
#include <stdio.h>

int main(void) {
  float R = 10.0, L = 2.0, J = 5.0;
  float *ptr;

  ptr = &R;          ptr points to R
  *ptr = *ptr + 10 - J;   10 + 10 - 5 = 15 = R

  ptr =&J;       points to j
  *ptr = *ptr - 9;        J = 5 - 9 = -4

  ptr = &L;      points to L
  *ptr = *ptr+ R +(*ptr)*4 - J;          2 + 15 + 2 * 4 + 4 = 29 = L

  J = R+L;       J = 15 + 29 = 44
  return 0;
}
```

12) What are the values of a, b, c, and d when the program ends? Write the values of a, b, c, and d next to each line of code to receive partial credit!

```
#include <stdio.h>

int funp(int x, int *y, int *z) {

  *z = *z + x + *y;
  (*y)++;
  x = x + 2*(*y-2) + *z;

  return 2*x;
}

int main(void) {

  int a = 1, b = 2, c = 3, d;

  d = funp(a, &b, &c);

  return 0;
}
```

13. Given the following program, answer the questions:

```
#include<stdio.h>
int main(void){
        FILE *ifile;
        double prc;
        ifile = fopen( ____ (A) _____________ );

        if(ifile == NULL){
                printf("the file does not exist\n");    }
        else{
                _____ (B) _____ {
                        if (prc >= 10 && prc < 20)
                                printf("%.2lf  ", prc);
                }
        }
        fclose(ifile);
        return 0;
    }
```

13a) Complete the C statement at (A) _____
to open "**input.txt**" to ***read***.

13b) If the **input.txt** is ***not*** in the appropriate folder, how does this program handle it (i.e. what it will do)?

13c) Complete the statement at (B) such that ***one number can be read in, from the input.txt file, at a time*** until the end of file.