Midterm Exam #1 Example Problems with Solution

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** __[T && !(F) = T && T]_

result = (x > y) || (x > z); result = **_0**____[F || F]_____

result = z%4 + y/4; result = **_5**_____2 + 3_____

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 = 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)` // infinite loop

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 = 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

no need to calculate y in the do_func function since it returns only x

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

i	
1	B
2	BB
3	BAB
4	BAAB
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");
 }
```

Answer:

```
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, j = 5;


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

            for(i = 1; i <= j; i = i +1){
                  printf("%c%d ", letter, i);
            }
            j = j-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. Below is an answer using double

```
double myfunc(double a, double b, double d){
        double c;
        double d_rad;
        double const pi = 3.14159;

        d_rad = d*pi/180;     //need to convert to radians to be used with cos( )

        c = sqrt(pow(a,2) + pow(b,2) – 2*a*b*cos(d_rad));

        return(c);
}
```

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 = 10
  *ptr = *ptr + 10 - J;              //*ptr = 10 + 10 – 5 = 15  <=  R

  ptr =&J;                           //*ptr = 5.0
  *ptr = *ptr - 9;                   //*ptr = 5 – 9 = -4  <= J

  ptr = &L;                          //*ptr = 2.0
  *ptr = *ptr+ R +(*ptr)*4 - J;      //*ptr = 2 + 15 +(2)*4 – (-4)  = 29  <= L

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

12) If so, what are the values of a, b, c, and d when the program ends? Write the values of 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) {      //when the funp is called in main
                                       //x = 1, y points to b, z points to c
                                       //x = 1, *y = 2, *z = 3

  *z = *z + x + *y;                    //*z = 3 + 1 + 2 = 6
  (*y)++;                              //*y = 3
  x = x + 2*(*y-2) + *z;               //x = 1 + 2(1) + 6 = 9

  return 2*x;                          //return  = 2(9) = 18
}

int main(void) {
  int a = 1, b = 2, c = 3, d;

  d = funp(a, &b, &c);                 //after the funp is executed
                                       //a = 1
                                       //b = 3
                                       //c = 6
                                       //d = 18
  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***.

```
___"input.txt", "r"__
```

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

Print "the file does not exist"

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.

```
while(fscanf(ifile, "%lf", &prc) != EOF)
```