Name: _____ Student ID: _____ Date: _____

Worksheet 6

Relational, Logical operators and *if* statements

Objectives

After completing this worksheet, you should be able to

- Comprehend the usage of relational and logical operators
- Understand the concept of conditional control structure
- Make decisions with ***if*** structure

1. Open a new project, write program 6.1 and run it.

```
#include <stdio.h>
int main(int argc, char *argv[]) {
  char a, b;          int c, d;          float e, f;
  a = 'x';            b = 'T';      c = 75;       d = 22;       e = 82.32;       f = 124.173;
  printf("a = \'%c\'  b = \'%c\'  c = %d  d = %d  e = %f  f = %f\n\n",a,b,c,d,e,f);
  printf("a == b is %d\n",a == b);
  printf("c == d is %d\n",c == d);
  printf("e == f is %d\n\n",e == f);
  printf("a != b is %d\n",a != b);
  printf("c != d is %d\n",c != d);
  printf("e != f is %d\n\n",e != f);
  printf("a > b is %d\n",a > b);
  printf("c > d is %d\n",c > d);
  printf("e > f is %d\n\n",e > f);
  printf("a >= b is %d\n",a >= b);
  printf("c >= d is %d\n",c >= d);
  printf("e >= f is %d\n\n",e >= f);
  printf("a < b is %d\n",a < b);
  printf("c < d is %d\n",c < d);
  printf("e < f is %d\n\n",e < f);
  printf("a <= b is %d\n",a <= b);
  printf("c <= d is %d\n",c <= d);
  printf("e <= f is %d",e <= f);

  return 0;
}
```

Program 6.1

2. Run the program and record the result in Table 6.1.

Results from step 7.	a == b	c == d	e == f	a != b	c != d	e != f	a > b	c > d	e > f
	a >= b	c >= d	e >= f	a < b	c < d	e < f	a <= b	c <= d	e <= f

Table 6.1

3. Open a new project and write Program 6.2, then run the program.

```
#include <stdio.h>
int main(int argc, char *argv[])    //  Logical operators combine the results of one or more expressions
{                                   // (composed- of relational operators) and they return zero (0) when the relation is
    int w, x, Result;                                                    // false and one (1) when it is true.
    float y, z;
    w = 10;     x = 20;     y = 50.5;     z = 100.0;
    printf("!(x > w) = %d\n",!(x > w));
    printf("(w < x) && (y < z) = %d\n", (w < x) && (y < z));
    printf("(w < x) && (y > z) = %d\n", (w < x) && (y > z));
    printf("(w < x) || (y < z) = %d\n", (w < x) || (y < z));
    printf("(w < x) || (y > z) = %d\n", (w < x) || (y > z));
    Result = ((w < 15) && (x >19)) || ((y < 55.5) && (!(z > y)));
    printf("Result = %d\n",Result);

    return  0;
}
```

Program 6.2

Record the results produced by the program in Table 6.2

Expressions	Results
!(x > w)	
(w < x) && (y < z)	
(w < x) && (y > z)	
(w < x) || (y < z)	
(w < x) || (y > z)	
((w < 15) && (x >19)) || ((y < 55.5) && (!(z > y)))	

Table 6.2

4. Open a new project and write program 6.3.

```
#include <stdio.h>
int main(int argc, char *argv[])
{
        int i;
        printf("Please enter an integer value: ");
        scanf("%d",&i);

        if (  i < 10 )
        {
            printf("Condition is true.\n");
        }
        printf("End of program.");

        return 0;
}
```

Program 6.3

5. Enter the input values shown in Table 6.3 and record the results in Table 6.3.

Input Values	Results from step 4.	Result from step 6.
-10	_____ _____	_____ _____
-5	_____ _____	_____ _____
0	_____ _____	_____ _____
10	_____ _____	_____ _____
15	_____ _____	_____ _____

Table 6.3

6. From program 6.3, change the statement

If(i <10) to if(i)

and run it. Enter the input values shown in Table 6.3 and record the results in Table 6.3.

In C language, it considers any numeric values as true values except _____ as a false value.

7. Open a new project and write program 6.4.

```
#include <stdio.h>
int main(int argc, char *argv[ ])
{
        int x;
        printf("Please enter a number : "); scanf("%d",&x);
        if ( x > 50 ) {
            printf("Your number is greater than 50.\n");
        }
        else {
            printf("Your number is equal or less than 50.\n");
        }
        return 0;
}
```

Program 6.4

8. Enter the input values shown in Table 6.4 and record the results in Table 6.4.

Input Values	Results from step 7.	Result from step 9.
100	_____ _____	_____ _____
80	_____ _____	_____ _____
50	_____ _____	_____ _____
20	_____ _____	_____ _____
-5	_____ _____	_____ _____

Table 6.4

9. Open a new project, write program 6.5. Then enter the input values shown in Table 6.4 and record the results in Table 6.4.

```
#include <stdio.h>
int main(int argc, char *argv[ ]) {
        int a, b = 999;
        printf("Please enter a number : "); scanf("%d",&a);
        if ( a >= 80 && a <= 100 )
                b = 111;
        if ( a <= 50 && a >= 40 )
                b = 222;
        if ( a < 0 )
                b = 333;
        printf("b = %d\n",b);

        return 0;
}
```

Program 6.5

10. Open a new project, write program 6.6.

```
#include <stdio.h>
int main(int argc, char *argv[ ]) {
        int Item;
        float Radius, Result;
        printf("1 Calculate area of circle.\n");
        printf("2 Calculate circumference of circle.\n");
        printf("Please enter item : ");       scanf("%d",&Item);
        printf("Please enter radius : "); scanf("%f",&Radius);
        if (Item == 1) {
                Result = 3.14159 * Radius * Radius;
                printf("Area of circle is %.3f\n",Result);
        } else  {
                Result = 2.0 * 3.14159 * Radius;
                printf("Circumference of circle is %.3f\n",Result);
        }

        return 0;
}
```

Program 6.6

Run the program and enter the input values as follows:

1. Enter **1** as an input value (Choose to compute the circle's area)
2. Enter **10** as the value of circle's radius.

Record the results.

Rerun the program and enter the input values as follows:

3. Enter **2** (or any numbers NOT **1**) as an input value (Choose to compute the circle's circumference)
4. Enter **10** as the value of circle's radius.

Record the results.

11. Open a new project, write program 6.7.

```
#include <stdio.h>
int main(int argc, char *argv[ ]) {
        int Score;
        printf("Please enter your score ( 1 –100 ) : "); scanf("%d",&Score);
        if (Score >= 80)                        printf("Your grade is A\n");
        else if (Score >= 70 && Score <= 79)    printf("Your grade is B\n");
        else if (Score >= 60 && Score <= 69)    printf("Your grade is C\n");
        else if (Score >= 50 && Score <= 59)    printf("Your grade is D\n");
        else                                    printf("Your grade is F\n");

        return 0;
}
```

Program 6.7

Run the program and try to enter an input value for each running as follows: **100, 80, 75, 70, 59, 50, 10, 1, 0**. Observe the results.

If we need to display the string “Your grade is B” We must enter .....

If we need to display the string “Your grade is F” We must enter .....

From Program 6.7, try deleting **&&** signs and their following expressions and observe the result.

Are the results different? _____

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Homework 6

1. Write a program accepting an integer value from the keyboard. Next verify that the entered value is even or odd number. Then show the message **“Your number is even”** or **“Your number is odd”** in accordance with the number entered by a user.
   (Hint: use **%** operator and **if() else** statement)

2. Write a program that accepts an integer value from the keyboard and stores it in a variable. Then the program will verify the value of variable and display a message according to conditions as follows:

   If $\mathbf{31 \leq input \leq 35}$ or $\mathbf{input = 50}$ or $\mathbf{95 \leq input \leq 100}$

   displays the message **"Lucky Number !!!"** otherwise shows the message **"Bad Number !!!"**

   (Hint: use **if() else** statement)