Objectives:
   1) Understand how to edit, compile and execute C computer
      codes.
   2) Understand C programming: sequential and selective code
      structure.

Note: Before writing a computer code, you should do the
following steps: 1) **understand** and **analyze** the problem, 2)
develop an **algorithm** and/or **flowchart** and 3) convert the
algorithm and/or the **flowchart** into a C **code**.

Part I: Trace Section
A/ What is the out of the following:
```
a) int a=9, b=4;
   float c,d;
   c = a/b;
   d = (float)a / (float)b;
   printf("c=%.2f,d=%.2f",c,d);
```

```
b) int    i = 5;
   float  j = 314.15;
   char   cr = '$';
   printf("%5i", i);
   printf("%6.1f", j);
   printf("%f", j);
   printf("%.1e", j);
   printf("%10.2e", j);
   printf("%c", cr);
```

```
c) int x, a = 5, b = 10;
x = a++ + b++;
printf("x=%d\na=%d\nb=%d\n",x,a,b);
```

```
d) int x, a = 5, b = 10;
x = ++a + ++b;
printf("x=%d,\n a=%d\nb=%d\n",x,a,b);
```

```
e) int x, a = 5, b = 10;
x = a++ + --b;
printf("x=%d,\n a=%d\nb=%d\n",x,a,b);
```

```
f) int a = 3, b = 5;
a += b;
printf("a=%d\n b=%d\n",a,b);
```

```
g) int a = 3, b = 5;
a += b++;
printf("a=%d\n b=%d\n",a,b);
```

```
h) int a = 3, b = 5;
a *= b -(b / 2);
printf("a=%d\n b=%d\n",a,b);
```

```
i) int a=3, b=5, c=4;
a += b -= --c * 2;
printf("a=%d,\n b=%d \nc=%d\n",a,b,c);
```

```
j) float x = 4;
x += 2 / 3;
printf("x=%lf\n",x);
```

```
k) float x = 4;
x += 2.0 / 3;
printf("x=%f\n",x);
```

```
l) float x = 4;
x += (float)2 / 3;
printf("x=%f\n",x);
```

```
m) int a = 5, b = 8;
a = b;
b = a;
printf("a=%d\n b=%d\n",a,b);
```

```
n) int a = 5, b = 8, temp;
temp = a;
a = b;
b = temp;
printf("a=%d\n b=%d\n",a,b);
```

B/ Given the following declarations,
float x;
int i,j,k;.
what is the output of:
```
a) i=5; j=2;
   if(i=50||j==2)
     printf("%d",i-j);
```

```
b) i=5; j=2;
   if(i==50||j==2)
    printf("%d",i-j);
```

```
c) i=1;j=1;k=1;
   k+=-i++ + ++j;
```

```
        printf("%d %d %d\n", i,j,k);

d)  i=1;j=2;x=3.0;
    x/=j=++i*2.5;
    printf("%f %d %d\n",x,i,j);

e)  i=1;j=2;x=3.0;
    x/=j=i++*2.5;
    printf("%f %d %d\n",x,i,j);

f)  i=-1; j=3;
    k = ++i&&--j;
    printf("i = %d j = %d k = %d\n", i, j, k);

g)  i=-1; j=3;
    k = i++&&--j;
    printf("i = %d j = %d k = %d\n", i, j, k);
h)  i=-1; j=0;
    k = i++||--j;
    printf("i = %d j = %d k = %d\n", i, j, k);
i)  i=6;j=1;k=3;
    k=i<j<k;
    printf("i = %d j = %d k = %d\n", i, j, k);

j)  j=9;k=2;
    i=j%k?++j:++k;
    printf("j = %d k = %d\n", j, k);

k)  i=1, j=3;k=7;
    i = (i < j)% j
    printf("i = %d j = %d k = %d\n", i, j, k);

l)  i=1, j=5;k=7;
    i=--i && --j || --k
    printf("i = %d j = %d k = %d\n", i, j, k);

m)  i=1, j=5;k=7;
    k= (++i +4)/(--k - j--)
    printf("i = %d j = %d k = %d\n", i, j, k);
```

Part II: Writing equivalent code segments
Rewrite the following using if-else-if structure
```
A/   switch(i){
     case 0: k+=i;break;
     case 1: k*=i;break;
     case 2: case 3: k/=i;break;
     default: k%=i;
     }
```
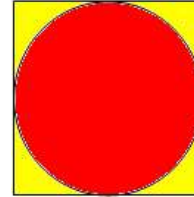
B/ FebDays =year%4 == 0? 29 : 28;

Part III: Program writing
1/ Write a program that reads the radius of the circle inscribed inside the square and based on that it will print the values of red and yellow areas, shown in the figure below. Print the values with 2 digits after decimal point. Define the value of π (3.1416) as a constant. A sample run of your program gives the following:

Enter the value of the radius: **1.578**
The yellow area is **2.14**
The red area is **7.82**

2/ Write a C code that reads two integer numbers and one operator (+, -, *,/), and then perform the required operation. A sample run of the program must be as follows:

*** Calculator Problem ***
Enter two numbers: **4 3**
Enter one operator: **+**
4 + 3 = 7

Note: If the user enters a wrong operator, then your code should display "wrong operator" as an output.

3) Consider the following quadratic equation:
$$A*X^2 + B*X + C$$
Then, the roots of this equation can be obtained as
X1 = (-B + SQRT(Disc))/(2*A)
X2 = (-B - SQRT(Disc))/(2*A)
where the discriminator **(Disc)** is given by
Disc = B^2 − 4*A*C
  A. Write a C program that will read the value of the inputs A, B, and C, and then check for the following conditions and do the corresponding tasks:
  ➢ If **Disc > 0**, then find the roots **X1** and **X2** and then display the result as,
     The roots are different: X1=…….. X2=………
  ➢ If **Disc = 0**, then find the roots **X1 and X2** and ten display the results as
     The roots are equal: X1 = X2=……….
  ➢ If **Disc <0**, then display the following message: **The roots are imaginary**.

  B. Re-write the same code by using switch statement rather than if/else.