Programming Language 2 Homework (structs)

1. Definition 1:A point is represented as x absis (double) and y ordinate (double) in Kartesian Coordinate System.
   Definition 2: A circle is represented as a center point and a radiun on the space.
   According to these definitions:
   a. Write a struct that represents a Point
   b. Write a struct that represents a Circul
   c. Write a function that returns a distance between two points taken as parameters.
   d. Write a function that checks whether a point is inside, outside or on a circle. A point and a circle are taken as parameters of function.
   e. Write a function that returns the around of a circle taken as a parameter.
   f. Write a function that returns the area of a circle taken as a parameter.
   g. Write a function that returns area between two circles which have the same center
2. Time is represented as hour (int), minute (int), second (int) and milisecond (int)
   a. Write a struct that represents a Time
   b. Definition: 1 day = (24 hours) = 86400000 mili second According to this definition , write a function that returns hour of a day for a given integer between 1-8640000 by user. Example: If the integer is 8640000, the time is 0:0:0.0. If integer is 101, the time is 0:0:1.1
   c. Write a function that returns a difference between two times zones. (The parameters of functions are two time zones and the function returns a time)
3. Definition: Date is represented as day (int), month (int) and year (int). According to this definition:
   a. Write Date struct.
   b. Write a function that returns a difference between two dates. (The parameters of functions are two dates and the function returns a date) (Take 1 month=30 days)
   c. Write a function that returns day of a year for a given integer bettween 1-365 and a year information. (if it is a leap year that takes 366 days) (Consider in a leap year February takes 29 days and a year is 366 days)
      Example: If year is 2019 and an integer is 10, the function must return the date as 10/1/2019. If year is 2020 (leap year) and an integer is 365, the function must return the date as 30/12/2020.
4. Definition: A Complex number is represented as real part (double) and imaginary part (double). According to this definition.
   a. Write Komplex struct
   b. Write a function that returns the conjugate of a given complex number.
   c. Write a function that returns the module of a given complex number.
   d. Write a function that returns the sum of given two complex numbers.
   e. Write a function that returns the difference between two complex numbers.
   f. Write a function that returns the multiplication of two complex numbers
   g. Write a function that returns the division of two complex numbers
   h. Write a function that returns nth power of a complex number. The parameters of function are a complex number and an integer. The function must return a complex number. The following formula calculates nth power of a complex number

$$\boldsymbol{let\ z\ \in C}$$

$$\boldsymbol{let\ z = a + ib\ then}$$

$$\boldsymbol{z^n = r^n[cos(n\Theta) + isin(n\Theta)]},$$

$$\Theta = \boldsymbol{atan}(\frac{b}{a})$$

$$\boldsymbol{r} = \sqrt{\boldsymbol{a^2 + b^2}}$$

i. Write a function that returns nth root of a complex number. The parameters of function are a complex number and an integer. The following formula calculates nth root of a complex number

$$Let\ Complex\ number\ be\ \ Z = a + ib$$

$$\theta = \text{atan}\left(\frac{b}{a}\right)$$

$$z^{\frac{1}{n}} = r^{\frac{1}{n}}\left[\cos\left(\frac{2k\pi + \theta)}{n}\right) + \text{isin}\left(\frac{2k\pi + \theta)}{n}\right)\right]$$

$$k = 0,1,2,, \dots, n-1$$

$$r = \sqrt{a^2 + b^2}$$

j. Aşağıda verilen programın çıktısını bulunuz?

```
#include <stdio.h>
#include <stdlib.h>
struct Yapi
{
    int b;
    int c;
};
struct Yapi Sacma(int d,int *e)
{
    struct Yapi q;
    q.b=*e+2;
    d++;
    q.c=d;
    *e*=2;
    printf("\n%d %d",d,*e);
    return q;
}
int main()
{
    int m=3,n=4;
    struct Yapi p;
    printf("\n%d %d\n",m,n);
    p=Sacma(m,&n);
    printf("\n%d %d %d %d",p.b,p.c,m,n);
    system("pause");
    return 0;
}
```