

Student Name: **KEY SOLUTION** ID:

The n^{th} root of a number X is computed using the iterative formula:

$$x_{k+1} = \frac{1}{n} \left[(n-1)x_k + \frac{X}{x_k^{n-1}} \right]$$

The iterations will stop when the difference between two (2) successive terms is less than a small value ϵ i.e. $|x_{k+1} - x_k| \leq \epsilon$, where ϵ is a constant value equal to 10^{-5} . Assume the initial value $x_0 = X/n$, x_k the old value and x_{k+1} the updated or new value.

Write a complete C program that prompts the user to enter the values of X and n , then computes the n^{th} root of X .

- The above formula must be implemented as a function `rootN()` which accepts both n and x as inputs and returns the n^{th} root of x .
- The code should check that when n is even, the value of X has to be **positive**, and for that purpose you need another small function that returns `TRUE` (1) if n is even and `FALSE` otherwise.

```
Enter n: 4
Enter X: -8
Wrong Input. Repeat again !
Enter n: 4
Enter X: 8
(4)th root of (8.00) = 1.681793
```

```
// Quiz 3 Sec 51 T 191
```

```
#include <stdio.h>
```

```
#include <math.h>
```

```
#define EPS 1E-5
```

```
double rootN(double x, int n);
```

```
int odd(int a);
```

```
int main(){
```

```
    int n;
```

```
    double X;
```

```
    do{
```

```
        printf("Enter n: ");
```

```
        scanf("%d", &n);
```

```
        printf("Enter X: ");
```

```
        scanf("%lf", &X);
```

```
        if(!odd(n) && (X < 0))
```

```
            printf("Wrong Input. Repeat again !\n");
```

```
    }while(!odd(n) && (X < 0));
```

```
    printf("( %d)th root of ( %0.2f) = %0.6fn", n,X,rootN(X,n));
```

```
    return 0;
```

```
}
```

```
double rootN(double X,int n){
```

```
    double error, xo, xn;
```

```
    xo = X/n;
```

```
    do{
```

```
        xn = ((n-1)*xo+X/pow(xo,n-1))/n;
```

```
        error = fabs(xo-xn);
```

```
        xo = xn;
```

```
    }while(error > EPS);
```

```
    return(xo);
```

```
}
```

```
int odd(int a){
```

```
    return(a%2);
```

```
}
```