

Assignment #3

Github: <https://github.com/excisionhd/CS256>

```
/******  
* FILENAME : hwThree.c  
*  
* DESCRIPTION :  
*   Homework Assignment #3  
*  
* AUTHOR : Amir Sotoodeh  
* START DATE : 4/15/18  
*  
*****/  
  
#include <stdio.h>  
#include <math.h>  
#include <stdlib.h>  
#define PI 3.14159  
  
float newPopulation(int P, float B, float D){  
    float new = (P + B*P - D*P);  
    return new;  
}  
  
int* reverseArray(int a[], int size){  
    int *array;  
    array= malloc(size*sizeof(int));  
  
    int j = 0;  
  
    for(int i = size;i>=0;i--){  
        array[j] = a[i];  
        j++;  
    }  
  
    return array;  
}  
  
int checkgameBoard(char gameBoard[3][3])
```

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{
    int x;
    for(x = 0; x < 3; x++)
    {

        if ((gameBoard[x][0] != '*') &&
            (gameBoard[x][0] == gameBoard[x][1]) &&
            (gameBoard[x][0] == gameBoard[x][2]))
            return(gameBoard[x][0] == 'O' ? -1 : 1);

        if ((gameBoard[0][x] != '*') &&
            (gameBoard[0][x] == gameBoard[1][x]) &&
            (gameBoard[0][x] == gameBoard[2][x]))
            return(gameBoard[0][x] == 'O' ? -1 : 1);
    };

    if ((gameBoard[0][0] != '*') &&
        (gameBoard[0][0] == gameBoard[1][1]) &&
        (gameBoard[0][0] == gameBoard[2][2]))
        return(gameBoard[0][0] == 'O' ? -1 : 1);

    if ((gameBoard[2][0] != '*') &&
        (gameBoard[2][0] == gameBoard[1][1]) &&
        (gameBoard[0][0] == gameBoard[0][2]))
        return(gameBoard[2][0] == 'O' ? -1 : 1);

    return 0;
}

```

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int main(){

    printf("CS256 Homework Assignment #3\n\n");

    //Chapter 4 Problem #23
    printf("Chapter 4 Problem 23: Geometry Calculator\n");

    printf("1. Calculate the Area of a Circle\n");
    printf("2. Calculate the Area of a Rectangle\n");
    printf("3. Calculate the Area of a Triangle\n");
}

```

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printf("4. Quit\n");
printf("Enter your choice (1-4):\n");

int choice;
scanf("%d", &choice);

if(choice == 1){
    printf("Enter the radius of the circle:\n");
    double radius;
    scanf("%le",&radius);
    if(radius<0){
        printf("Error: Invalid entry.\n");
    }
    else{
        printf("The area of the circle is: %.2f\n",pow(radius,2)*PI);
    }
}
else if(choice == 2){
    printf("Enter the length and width of the rectangle:\n");
    double length;
    double width;
    scanf("%le%lf",&length,&width);

    if(length<0 || width<0){
        printf("Error: Invalid entry.\n");
    }
    else{
        printf("The area of the rectangle is: %.2f\n", length*width);
    }
}
else if(choice == 3){
    printf("Enter the base and height of the triangle:\n");
    double base;
    double height;
    scanf("%le%lf",&base,&height);

    if(base<0 || height<0){
        printf("Error: Invalid entry.\n");
    }
    else{
        printf("The area of the triangle is: %.2f\n", 0.5*base*height);
    }
}
```

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}
else if(choice == 4){
    exit(0);
}
else{
    printf("Error: Invalid choice.\n");
}

```

//Chapter 6 Problem 16: Population

```

printf("\nChapter 6 Problem 16: Population\n");
int startingSize;
float birthRate;
float deathRate;
int years;
printf("Please enter starting population size:\n");
scanf("%d",&startingSize);
if(startingSize<2){
    exit(0);
}
printf("Please enter the annual birth rate:\n");
scanf("%f",&birthRate);
printf("Please enter the annual death rate:\n");
scanf("%f",&deathRate);
if(birthRate<0 || deathRate<0){
    exit(0);
}
printf("Please enter the amount of years to display:\n");
scanf("%d",&years);
if(years<1){
    exit(0);
}

if(years <2){
    exit(0);
}
else{
    float newPop = (float)newPopulation(startingSize,birthRate,deathRate);
    printf("Year 1: %.0f\n",newPop);

    for(int i = 0; i<years-1; i++){
        newPop = newPopulation(newPop,birthRate,deathRate);
        printf("Year %d: %.0f\n",i+2,newPop);
    }
}

```

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    }
}

printf("\nChapter 7 Problem 18 Tic-Tac-Toe Game");

int player = 0;
int winner = 0;
int row = 0;
int column = 0;
int line = 0;
char gameBoard [3][3] = {
    {'*', '*', '*'},
    {'*', '*', '*'},
    {'*', '*', '*'}
};

for (int i = 0; i<9 && winner==0; i++)
{
    printf("\n\n");
    printf(" %c | %c | %c\n", gameBoard[0][0], gameBoard[0][1],
gameBoard[0][2]);
    printf("---|---|---\n");
    printf(" %c | %c | %c\n", gameBoard[1][0], gameBoard[1][1],
gameBoard[1][2]);
    printf("---|---|---\n");
    printf(" %c | %c | %c\n", gameBoard[2][0], gameBoard[2][1],
gameBoard[2][2]);
    player = i%2 + 1;

    do
    {
        printf("\nPlayer %d, please enter the row and column of
where you want to place your %c: ", player, (player==1)?'X':'O');
        scanf("%d%d", &row, &column);
    }while((row > 2 || column > 2 || row<0 || column <0) ||
(gameBoard[row][column] == 'X' || gameBoard[row][column] == 'O'));

    gameBoard[row][column] = (player == 1) ? 'X' : 'O';

    winner = checkgameBoard(gameBoard);

}

if(winner==0)

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        printf("The game is a draw\n");
    else
        printf("\nPlayer %d has won\n", winner);

    printf("\n\n");
    printf(" %c | %c | %c\n", gameBoard[0][0], gameBoard[0][1], gameBoard[0][2]);
    printf("---|---|---\n");
    printf(" %c | %c | %c\n", gameBoard[1][0], gameBoard[1][1], gameBoard[1][2]);
    printf("---|---|---\n");
    printf(" %c | %c | %c\n", gameBoard[2][0], gameBoard[2][1], gameBoard[2][2]);

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printf("Chapter 9 Problem 10: Reverse Array\n");

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int array[] = {10, 20, 30, 40, 50};

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int *reversedArray = reverseArray(array, 5);

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printf("Original array: ");
for(int i = 0; i < 5; i++){
    printf("%d ", array[i]);
}
printf("\n");

```

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printf("Reversed array: ");
for(int i = 1; i < 6; i++){
    printf("%d ", reversedArray[i]);
}

```

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return 0;

```

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}

```

Output

CS256 Homework Assignment #3

Chapter 4 Problem 23: Geometry Calculator

1. Calculate the Area of a Circle
2. Calculate the Area of a Rectangle
3. Calculate the Area of a Triangle
4. Quit

Enter your choice (1-4):

1

Enter the radius of the circle:

10

The area of the circle is: 314.16

Chapter 6 Problem 16: Population

Please enter starting population size:

100

Please enter the annual birth rate:

1

Please enter the annual death rate:

0

Please enter the amount of years to display:

2

Year 1: 200

Year 2: 400

Chapter 7 Problem 18 Tic-Tac-Toe Game

```
* | * | *
---|---|---
* | * | *
---|---|---
* | * | *
```

Player 1, please enter the row and column of where you want to place your X: 1 0

```
* | * | *
---|---|---
X | * | *
---|---|---
* | * | *
```

Player 2, please enter the row and column of where you want to place your O: 0 0

```
O | * | *
---|---|---
X | * | *
---|---|---
* | * | *
```

Player 1, please enter the row and column of where you want to place your X: 1 1

```
O | * | *
---|---|---
X | X | *
---|---|---
* | * | *
```

Player 2, please enter the row and column of where you want to place your O: 0 1

```
O | O | *
---|---|---
X | X | *
---|---|---
* | * | *
```

Player 1, please enter the row and column of where you want to place your X: 1 2

Player 1 has won

```
O | O | *
---|---|---
X | X | X
---|---|---
* | * | *
```

Chapter 9 Problem 10: Reverse Array

Original array: 10 20 30 40 50

Reversed array: 50 40 30 20 10