21BDS0340

Abhinav Dinesh Srivatsa

Structured and Object-Oriented Programming

BCSE102

Digital Assignment 1

Contents

M1_1

AIM

The table below shows the normal boiling points of several substances. Write a program that prompts the user for the observed boiling point of a substance in °C and identifies the substance if the observed boiling point is within 5% of the expected boiling point. If the data input is more than 5% higher or lower than any of the boiling points in the table, the program should output the message Substance unknown.

Substance	Normal boiling point (°C)
Water	100
Mercury	357
Copper	1187
Silver	2193
Gold	2660

Algorithm / Pseudocode

Declare integer array Temps as array of given temperatures

Declare integer T

Read input and store as T

Declare integer flag as 0

Loop from 0 to length of array Temps as X

    Declare integer Lowert as Temps[X] * 0.95

    Declare integer Uppert as Temps[X] * 1.05

    If T > Lowert and T < Uppert, then

        If X = 0, then display 'Water'

        If X = 1, then display 'Mercury

        If X = 2, then display 'Copper

        If X = 3, then display 'Silver'

        If X = 4, then display 'Gold'

        Assign Flag as 1

        Break the loop

If Flag = 0, then print ‘Substance unknown’

Program Code

```
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <stdio.h>

int main()
{
    int temps[] = {100, 357, 1187, 2193, 2660};
    int t;
    scanf("%d", &t);
    int flag = 0;
    for (int x = 0; x < sizeof(temps) / sizeof(temps[0]); x++)
    {
        int lowert = temps[x] * 0.95;
        int uppert = temps[x] * 1.05;
        if (t > lowert && t < uppert)
        {
            switch (x)
            {
            case 0:
                printf("Water");
                break;
            case 1:
                printf("Mercury");
                break;
            case 2:
                printf("Copper");
                break;
            case 3:
                printf("Silver");
                break;
            case 4:
                printf("Gold");
            }
            flag = 1;
            break;
        }
    }
    if (flag == 0)
    {
        printf("Substance unknown");
    }
}
```

Output

Substance	Normal boiling point (°C)
Water	100
Mercury	357
Copper	1187
Silver	2193
Gold	2660

For example:

Test	Input	Result
1	355	Mercury

Answer: (penalty regime: 0 %)

```
#include <stdio.h>

int main()
{
    int temps[] = {100, 357, 1187, 2193, 2660};
    int t;
    scanf("%d", &t);
    int flag = 0;
    for (int x = 0; x < sizeof(temps) / sizeof(temps[0]); x++)
    {
        int lowert = temps[x] * 0.95;
        int uppert = temps[x] * 1.05;
        if (t > lowert && t < uppert)
        {
            switch (x)
            {
            case 0:
                printf("Water");
                break;
            case 1:
                printf("Mercury");
                break;
```

	Test	Input	Expected	Got	
✔	1	355	Mercury	Mercury	✔
✔	2	2663	Gold	Gold	✔
✔	4	80	Substance unknown	Substance unknown	✔

Passed all tests! ✔

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1 2 3 4 5 6

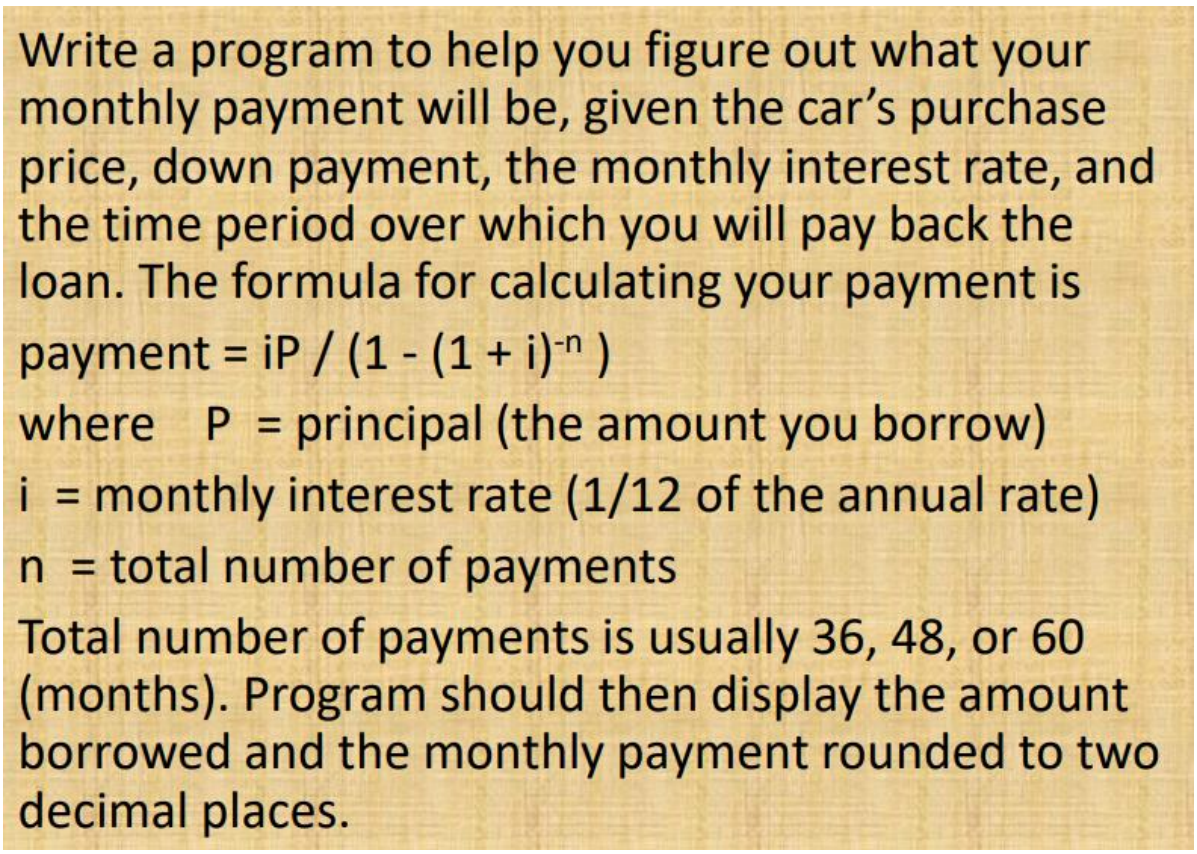
Show all questions on one page

Finish review

M1_2

AIM

Develop a c Program to deal with N loans. Use math.h library for pow(a,b) and printf("%.2f",a) to print a value with two precision.



Algorithm / Pseudocode

Declare integer N

Read input and assign to N

Declare integers P, D, I, T

Loop for integer X as 0 while less than N

Read 4 inputs and assign them to P, D, I, T respectively

If T = 36, 48 or 60, then

Declare float Loan as P – D

Assign Loan as Loan * I / 1200

Declare float Den as $1 – (1 + I/1200)^{-T}$

Assign Loan as Loan / Den

Display Loan with 2 decimal points

Program Code

```c
//21BDS0340 Abhinav Dinesh Srivatsa

#include <stdio.h>
#include <math.h>

int main()
{
    int n;
    scanf("%d", &n);
    int p, d, i, t;
    for (int x = 0; x < n; x++)
    {
        scanf("%d %d %d %d", &p, &d, &i, &t);
        if (t == 36 || t == 48 || t == 60)
        {
            float loan = p - d;
            loan *= (float)i / 1200;
            float den = 1 - pow(1 + (float)i/1200, -(float)t);
            loan /= den;
            printf("%.2f\n", floor(loan * 100) / 100);
        }
    }
}
```

Output

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Answer: (penalty regime: 0 %)

```
//21BDS0340 Abhinav Dinesh Srivatsa
/*
Declare integer N
Read input and assign to N
Declare integers P, D, I, T
Loop for integer X as 0 while less than N
    Read 4 inputs and assign them to P, D, I, T respectively
    If T = 36, 48 or 60, then
        Declare float Loan as P - D
        Assign Loan as Loan * I / 1200
        Declare float Den as 1 - (1 + I/1200)-T
        Assign Loan as Loan / Den
        Display Loan with 2 decimal points
*/

#include <stdio.h>
#include <math.h>

int main()
{
    int n;
    scanf("%d", &n);
```

Check

	Test	Input	Expected	Got	
✔	1	2 400000 100000 10 36 500000 250000 10 48	9680.16 6340.65	9680.16 6340.65	✔
✔	2	3 400000 100000 10 36 500000 250000 10 48 400000 200000 10 60	9680.16 6340.65 4249.41	9680.16 6340.65 4249.41	✔

Passed all tests! ✔

M2_1

AIM

Huffman code is a particular type of optimal prefix code for characters. It is commonly used for lossless data compression. It is a variable-length code derived from frequency of occurrence. Given a string develop an algorithm and write a C program to determine frequency of occurrence of each character in the string.

Algorithm / Pseudocode

Declare character array as Sen

Read input till new line and assign to Sen

Declare integer array Count

Declare integer X as 0

Loop while X < 26

    Assign Count[X] as 0 and increment X

Declare integer Ord

Loop while Sen[X] is not '\0'

    Calculate Ord as integer casted Sen[X]

    If Ord is between 'A' and 'Z', then make it lower case

    If Ord is not space, then increment Count[Ord – 'a']

Loop from 0 to 26 as X

    If Count[X] is not 0, then display the character spaced with the Count[X]

Program Code

```c
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <stdio.h>

int main()
{
    char sen[50];
    scanf("%[^\n]s", sen);
    int count[26];
    int x = 0;
    while (x < 26)
    {
```

```
        count[x++] = 0;
    }
    x = 0;
    int ord;
    while (sen[x] != '\0')
    {
        ord = (int)sen[x++];
        if (ord <= 'Z' && ord >= 'A')
        {
            ord += 32;
        }
        if (ord != ' ')
        {
            count[ord - 'a']++;
        }
    }
    for (x = 0; x < 26; x++)
    {
        if (count[x] != 0)
        {
            printf("%c %d\n", x + 'a', count[x]);
        }
    }
}
```

Output

Test	Input	Result
1	All is Well	a 1 e 1 i 1 l 4 s 1 w 1

Answer: (penalty regime: 0 %)

```
// 21BDS0340 Abhinav Dinesh Srivatsa
/*
Declare character array as Sen
Read input till new line and assign to Sen
Declare integer array Count
Declare integer X as 0
Loop while X < 26
    Assign Count[X] as 0 and increment X
Declare integer Ord
Loop while Sen[X] is not '\0'
    Calculate Ord as integer casted Sen[X]
    If Ord is between 'A' and 'Z', then make it lower case
    If Ord is not space, then increment Count[Ord - 'a']
Loop from 0 to 26 as X
    If Count[X] is not 0, then display the character spaced with t
*/

#include <stdio.h>

int main()
{
```

	Test	Input	Expected	Got	
✔	1	All is Well	a 1 e 1 i 1 l 4 s 1 w 1	a 1 e 1 i 1 l 4 s 1 w 1	✔
✔	2	Be Positive	b 1 e 2 i 2 o 1 p 1 s 1 t 1 v 1	b 1 e 2 i 2 o 1 p 1 s 1 t 1 v 1	✔

Passed all tests! ✔

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1 2 3 4 5 6

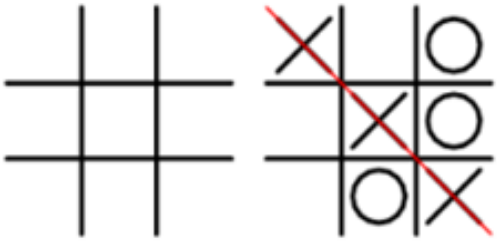
Show all questions on one page

Finish review

M2_2

AIM

Tic-tac-toe is a paper-and-pencil game for two players, X and O, who take turns marking the spaces n a 3×3 grid. Player who succeeds in placing three of their marks in a horizontal, vertical, or diagonal row wins the game.



Given the board configuration of the tic tac toe game, determine if the board is in either of the following states: empty, player1 wins, player2 wins, draw or intermediate. The board is said to be in initial state if all the cells contain '-1', player1 uses '1' as his coin and player2 uses '2' as his coin. The game is draw when the board is full and no one has won the game. The game is in intermediate state when no one has won and board is not full

Use the following function signatures

void read_Board(int ttt[][3]);

int count_EmptyCell(int ttt[][3]);

int check_Rowwise(int ttt[][3],int);

int check_Colwise(int ttt[][3],int);

int check_Diagonalwise(int ttt[][3],int);

Algorithm / Pseudocode

Void read_Board(int TTT[3][3])

    Loop from 0 to 3 as X

        Loop from 0 to 3 as Y

            Read input and assign to TTT[X][Y]

Int count_EmptyCell(int TTT[3][3])

    Declare integer Count as 0

```
        Loop from 0 to 3 as X
                Loop from 0 to 3 as Y
                        If TTT[X][Y] = -1, then increment Count
        Return Count
Int check_Rowwise(int TTT[3][3])
        Declare integer Val
        Loop from 0 to 3 as X
                Assign Val as TTT[X][0]
                If TTT[X][1] and TTT[X][2] are equal to Val, then return Val
        Return 0
Int check_Colwise(int TTT[3][3])
        Declare integer Val
        Loop from 0 to 3 as X
                Assign Val as TTT[0][X]
                If TTT[1][X] and TTT[2][X] are equal to Val, then return Val
        Return 0
Int check_Diagonalwise(int TTT[3][3])
        Declare integer Val
        Assign Val as TTT[0][0]
        If TTT[1][1] and TTT[2][2] equal Val, then return Val
        Assign Val as TTT[0][2]
        If TTT[1][1] and TTT[2][0] equal Val, then return Val
        Return 0
Declare integer array TTT with 3 rows and 3 columns
Call read_Board(TTT)
Declare integer Emptycells and assign it by calling count_EmptyCell(TTT)
```

If Emptycells = 9, then display ‘Empty’

Else if Emptycells = 0, then

Declare integer Rowwin and assign it by calling check_Rowwise(TTT)

Declare integer Colwin and assign it by calling check_Colwise(TTT)

Declare integer Diagwin and assign it by calling check_Diagonalwise(TTT)

If Rowwin, Colwin and Diagwin are 0, then display ‘Draw’

Else if Rowwin is not 0, then display ‘Player{Rowwin} wins’

Else if Colwin is not 0, then display ‘Player{Colwin} wins’

Else if Diagwin is not 0, then display ‘Player{Diagwin} wins’

Else display ‘Intermediate’

Program Code

```
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <stdio.h>

void read_Board(int ttt[3][3])
{
    for (int x = 0; x < 3; x++)
    {
        for (int y = 0; y < 3; y++)
        {
            scanf("%d", &ttt[x][y]);
        }
    }
}

int count_EmptyCell(int ttt[3][3])
{
    int count = 0;
    for (int x = 0; x < 3; x++)
    {
        for (int y = 0; y < 3; y++)
        {
            if (ttt[x][y] == -1)
            {
                count++;
            }
        }
    }
```

```
    return count;
}

int check_Rowwise(int ttt[3][3])
{
    int val;
    for (int x = 0; x < 3; x++)
    {
        val = ttt[x][0];
        if (ttt[x][1] == val && ttt[x][2] == val)
        {
            return val;
        }
    }
    return 0;
}

int check_Colwise(int ttt[3][3])
{
    int val;
    for (int x = 0; x < 3; x++)
    {
        val = ttt[0][x];
        if (ttt[1][x] == val && ttt[2][x] == val)
        {
            return val;
        }
    }
    return 0;
}

int check_Diagonalwise(int ttt[3][3])
{
    int val;
    // primary diagonal
    val = ttt[0][0];
    if (ttt[1][1] == val && ttt[2][2] == val)
    {
        return val;
    }
    // secondary diagonal
    val = ttt[0][2];
    if (ttt[1][1] == val && ttt[2][0] == val)
    {
        return val;
    }
    return 0;
}
```

```c
int main()
{
    int ttt[3][3];
    read_Board(ttt);
    int emptycells = count_EmptyCell(ttt);
    if (emptycells == 9)
    {
        printf("Empty");
    }
    else if (emptycells == 0)
    {
        int rowwin = check_Rowwise(ttt);
        int colwin = check_Colwise(ttt);
        int diagwin = check_Diagonalwise(ttt);
        if (rowwin == 0 && colwin == 0 && diagwin == 0)
        {
            printf("Draw");
        }
        else if (rowwin != 0)
        {
            printf("Player%d wins", rowwin);
        }
        else if (colwin != 0)
        {
            printf("Player%d wins", colwin);
        }
        else if (diagwin != 0)
        {
            printf("Player%d wins", diagwin);
        }
    }
    else
    {
        printf("Intermediate");
    }
}
```

Output

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```
2
2
1
-1
```

Answer: (penalty regime: 0 %)

```
// 21BDS0340 Abhinav Dinesh Srivatsa
/*
Void read_Board(int TTT[3][3])
    Loop from 0 to 3 as X
        Loop from 0 to 3 as Y
            Read input and assign to TTT[X][Y]
Int count_EmptyCell(int TTT[3][3])
    Declare integer Count as 0
    Loop from 0 to 3 as X
        Loop from 0 to 3 as Y
            If TTT[X][Y] = -1, then increment Count
    Return Count
Int check_Rowwise(int TTT[3][3])
    Declare integer Val
    Loop from 0 to 3 as X
        Assign Val as TTT[X][0]
        If TTT[X][1] and TTT[X][2] are equal to Val, then return V
    Return 0
Int check_Colwise(int TTT[3][3])
Declare integer Val
Loop from 0 to 3 as X
```

Check

	Test	Input	Expected	Got	
✔	1	1 2 1 2 1 2 2 1 -1	Intermediate	Intermediate	✔
✔	2	1 2 1 2 1 2 2 1 1	Player1 wins	Player1 wins	✔

Passed all tests! ✔

M3_1

AIM

Create a program in C to dynamically allocate integer array. Display the elements of the array using dereferencing operator in the reverse order.

Algorithm / Pseudocode

Declare integer N

Read input and assign to N

Declare integer pointer Arr and assign array of N spaces

Loop from 0 to N as X

  Read input and assign to Arr[X]

Calculate Arr as Arr + N - 1

Loop from N - 1 to -1 as X

  Display value of Arr

  Decrement Arr

Program Code

```c
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <stdio.h>
#include <stdlib.h>

int main()
{
    int n;
    scanf("%d", &n);
    int *arr = malloc(n * sizeof(int));
    for (int x = 0; x < n; x++)
        scanf("%d", (arr + x));
    for (int x = n - 1; x > -1; x--)
        printf("%d\n", *(arr + x));
    free(arr);
}
```

Output

1	3 10 20 30	30 20 10

Answer: (penalty regime: 0 %)

```
// 21BDS0340 Abhinav Dinesh Srivatsa
/*
Declare integer N
Read input and assign to N
Declare integer pointer Arr and assign array of N spaces
Loop from 0 to N as X
    Read input and assign to Arr[X]
Calculate Arr as Arr + N - 1
Loop from N - 1 to -1 as X
    Display value of Arr
    Decrement Arr
*/

#include <stdio.h>
#include <stdlib.h>

int main()
{
    int n;
    scanf("%d", &n);
    int *arr = malloc(n * sizeof(int));
    for (int x = 0; x < n; x++)
```

Check

	Test	Input	Expected	Got	
✔	1	3 10 20 30	30 20 10	30 20 10	✔
✔	2	4 -5 -4 -3 -2	-2 -3 -4 -5	-2 -3 -4 -5	✔

Passed all tests! ✔

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1 2 3 4 5 6 7 8 10

Finish attempt ...

M4_1

AIM

Create an employee structure with elements, empid, name, age, dept, designation, salary. Define array of employees and pass to a function to read the values and another function to sort the employees based on age attribute, display only empid.

Algorithm / Pseudocode

Declare structure employee with 6 fields:

Integer Empid

Character array Name with 10 spaces

Integer Age

Character array Dept with 6 spaces

Character array Desig with 15 spaces

Integer Salary

void sort_21BDS0340(struct employee *E)

Read inputs and store as E's Empid, Name, Age, Dept, Desig, Salary

void sort_21BDS0340(struct employee E[3])

Declare employee Temp

Loop from 0 to 2 as X

Loop from 0 to 2 - X as Y

If E[Y]'s Age > E[Y+1]'s Age, then

Assign Temp as E[Y]

Assign E[Y] as E[Y+1]

Assign E[Y+1] as Temp

Declare employee E with 3 spaces

Loop from 0 to 3 as X

Call getValues_21BDS0340 and pass E[X]

Call sort_21BDS0340 and pass E

Loop from 2 to -1 as X

Display E[X]'s Empid

Program Code

```
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <stdio.h>

struct employee
{
    int empid;
    char name[10];
    int age;
    char dept[6];
    char desig[15];
    int salary;
};

void getValues_21BDS0340(struct employee *e)
{
    scanf("%d%s%d%s%s%d", &e->empid, e->name, &e->age, e->dept, e->desig, &e-
>salary);
}

void sort_21BDS0340(struct employee e[3])
{
    struct employee temp;
    for (int x = 0; x < 2; x++)
        for (int y = 0; y < 2 - x; y++)
            if (e[y].age > e[y + 1].age)
            {
                temp = e[y];
                e[y] = e[y + 1];
                e[y + 1] = temp;
            }
}

int main()
{
    struct employee e[3];
    for (int x = 0; x < 3; x++)
```

```
    {
        getValues_21BDS0340(&e[x]);
    }
    sort_21BDS0340(e);
    for (int x = 2; x >= 0; x--)
    {
        printf("%d\n", e[x].empid);
    }
}
```

Output

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```
    Read inputs and store as E's Empid, Name, Age, Dept, Desig, Sa

void sort_21BDS0340(struct employee E[3])
    Declare employee Temp
    Loop from 0 to 2 as X
        Loop from 0 to 2 - X as Y
            If E[Y]'s Age > E[Y+1]'s Age, then
                Assign Temp as E[Y]
                Assign E[Y] as E[Y+1]
                Assign E[Y+1] as Temp
```

Check

	Test	Input	Expected	Got	
✔	1	10001 abc 31 deptA Supervisor 40000 10010 def 28 deptB Trainee 25000 10005 ghi 40 deptA ProdManager 80000	10005 10001 10010	10005 10001 10010	✔
✔	2	10002 abc 25 deptA Supervisor 40000 10006 def 26 deptB Trainee 25000 10008 ghi 27 deptA ProdManager 80000	10008 10006 10002	10008 10006 10002	✔

Passed all tests! ✔

M4_2

AIM

The weather station of each city has the detail of rainfall in a year. Given the date and cm of rainfall recorded on that day, write a C program to determine the rainfall recorded in each month of the year and average monthly rainfall in the year

Note: please use structure for rainfall and date with necessary attributes. Please store date character array appropriately in date structure variable while returning from function.

Algorithm / Pseudocode

Declare structure date with 3 fields:

Integer D

Integer M

Integer Y

Declare structure rain with 2 fields:

Date Date

Integer Cm

struct date dateToStruct(char Array[11])

Declare date D

Assign D.D as the date part of Array

Assign D.M as the month part of Array

Assign D.Y as the year part of Array

Return D

Declare integer N

Read input and assign to N

Declare rain array R with N spaces

Declare character array Datestr with 11 spaces

Loop from 0 to N as X

    Read inputs and assign to Datestr and R[X]'s Cm

    Assign R[X]'s Date by calling dateToStruct and passing Datestr

Declare integer array Month_rain with 12 empty spaces

Declare integer Total_rain as 0

Loop from 0 to N as X

    Calculate Month_rain[R[X]'s Date's D] as itself + R[X]'s Cm

    Calculate Total_rain as itself + R[X]'s Cm

Loop from 0 to N as X

    If Month_rain[X] is not 0, then display X + 1 and Month_rain[X]

Display Total_rain / N

Program Code

```
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <stdio.h>
#include <stdlib.h>
#include <math.h>

struct date
{
    int d;
    int m;
    int y;
};

struct rain
{
    struct date date;
    int cm;
};

struct date dateToStruct(char array[11])
{
    struct date d;
    d.d = atoi(array);
    d.m = atoi(&array[3]);
    d.y = atoi(&array[6]);
```

```
    return d;
}

int main()
{
    int n;
    scanf("%d", &n);
    struct rain *r = malloc(n * sizeof(struct rain));
    char datestr[11];
    for (int x = 0; x < n; x++)
    {
        scanf("%s%d", datestr, &(r + x)->cm);
        (r + x)->date = dateToStruct(datestr);
    }
    int *month_rain = calloc(12, sizeof(int));
    int total_rain = 0;
    for (int x = 0; x < n; x++)
    {
        month_rain[(r + x)->date.m - 1] += (r + x)->cm;
        total_rain += (r + x)->cm;
    }
    for (int x = 0; x < 12; x++)
        if (month_rain[x] != 0)
            printf("%d\n%d\n", (x + 1), month_rain[x]);
    printf("%d", (int)round((float)total_rain / n));
    free(month_rain);
    free(r);
}
```

Output

For example:

Test	Input	Result
1	4 05-01-2022 18 15-01-2022 20 03-02-2022 16 01-03-2022 15	1 38 2 16 3 15 17

Answer: (penalty regime: 0 %)

```
// 21BDS0340 Abhinav Dinesh Srivatsa
/*
Declare structure date with 3 fields:
    Integer D
    Integer M
    Integer Y

Declare structure rain with 2 fields:
    Date Date
    Integer Cm

struct date dateToStruct(char Array[11])
    Declare date D
    Assign D.D as the date part of Array
    Assign D.M as the month part of Array
    Assign D.Y as the year part of Array
    Return D

Declare integer N
Read input and assign to N
Declare rain array R with N spaces
```

Check

	Test	Input	Expected	Got	
✔	1	4 05-01-2022 18 15-01-2022 20 03-02-2022 16 01-03-2022 15	1 38 2 16 3 15 17	1 38 2 16 3 15 17	✔
✔	2	5 15-01-2022 16 25-01-2022 20 13-02-2022 15 11-03-2022 15 12-03-2022 18	1 36 2 15 3 33 17	1 36 2 15 3 33 17	✔

Passed all tests! ✔

ABHINAV DINESH SRIVATSA 21BDS0340

1 2 3 4 5 6 7 8 10

Finish attempt ...

M5_1

AIM

In an online examination system, each test will be scheduled for ‘x’ minutes. The student is free to take up the test on his convenience but once he starts the test, he must complete. Given the start time and the value of ‘x’ for an examination, develop an algorithm and write a ‘C++’ code for the examination system to calculate the finish time of the test

Algorithm / Pseudocode

Test:

Declare integer Testtime

Declare integer Hour

Declare integer Minute

Public void readValues():

Declare integer TT, H, M

Assign Testtime as TT

Assign Hour as H

Assign Minute as M

Public void showEndTime():

Calculate Minute as Minute + Testtime

If Minute > 59, then calculate Hour as Hour + Minute / 60 and calculate minute as minute % 60

If Hour > 12, then calculate Hour as Hour - 12

If Hour < 10, then display "0" + Hour + ":"

Else display Hour + ":"

If Minute < 10, then display "0" + Minute

Else display Minute

Declare Test T

Call T.readValues()

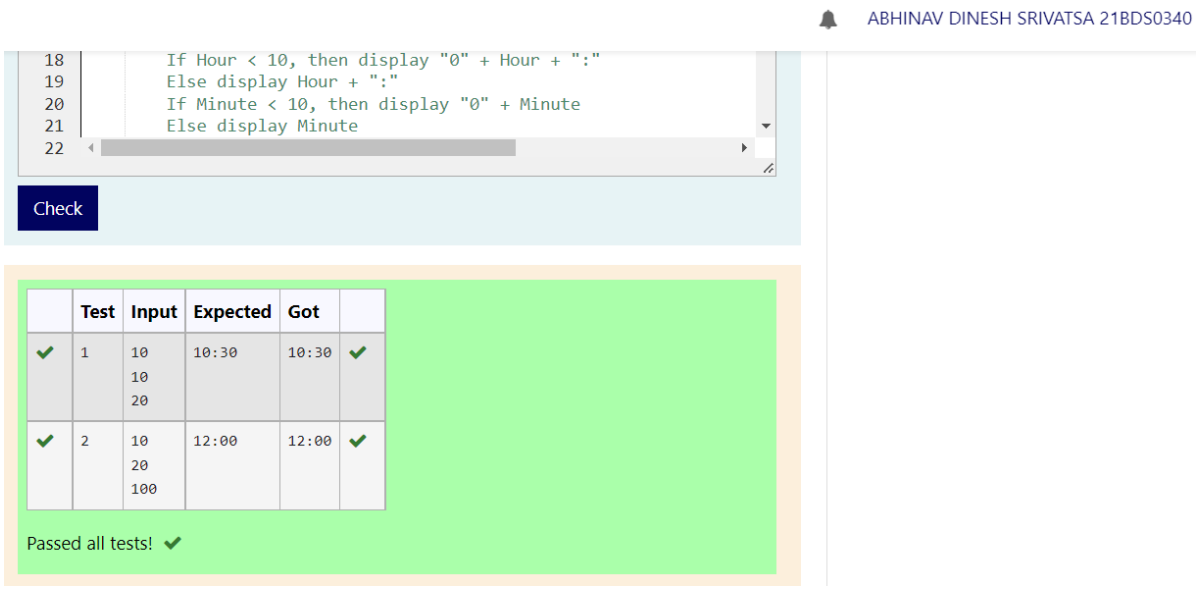
Call T.showEndTIme()

Program Code

```
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <iostream>
using namespace std;

class Test
{
    int testtime;
    int hour;
    int minute;

public:
    void readValues()
    {
        int tt, h, m;
        cin >> h >> m >> tt;
        testtime = tt;
        hour = h;
        minute = m;
    }

    void showEndTime()
    {
        minute += testtime;
        if (minute > 59)
        {
            hour += minute / 60;
            minute %= 60;
        }
        if (hour > 12)
            hour -= 12;

        if (hour < 10)
            cout << "0" << hour << ":";
        else
            cout << hour << ":";
        if (minute < 10)
            cout << "0" << minute;
        else
            cout << minute;
    }
```

```
};

int main()
{
    Test t;
    t.readValues();
    t.showEndTime();
}
```

Output



M5_2

AIM

Develop a friend function to calculate total fare for a ticket. There are ‘n’ passengers in the ticket and they are from a family of a railway employee. Discount is given for their travel based on the cader of the employee.

If Cader A - 10%, B - 15%, C - 20%

Algorithm / Pseudocode

Fare:

Declare integer Passengers

Declare character array From with 20 spaces

Declare character array To with 20 spaces

Declare integer Ticket_cost

Declare character Cader

Fare(int P, char F[20], char T[20], int Tc, char C):

Assign Passengers as P

Assign From as F

Assign To as T

Assign Ticket_cost as Tc

Assign Cader as C

Declare Price as friend class

Price:

Int calculate(Fare F):

Switch F's Cader

If 'A', then return F's Ticket_cost * F's Passengers * 0.9

If 'B', then return F's Ticket_cost * F's Passengers * 0.85

If 'C', then return F's Ticket_cost * F's Passengers * 0.8

Return 0

Int main():

Declare integers P and Tc

Declare character C and arrays Fr and T with 20 spaces

Read input and assign to P, Fr, T, Tc and C respectively

Declare Fare F() passing P, Fr, T, Tc and C as arguments

Declare Price Pr

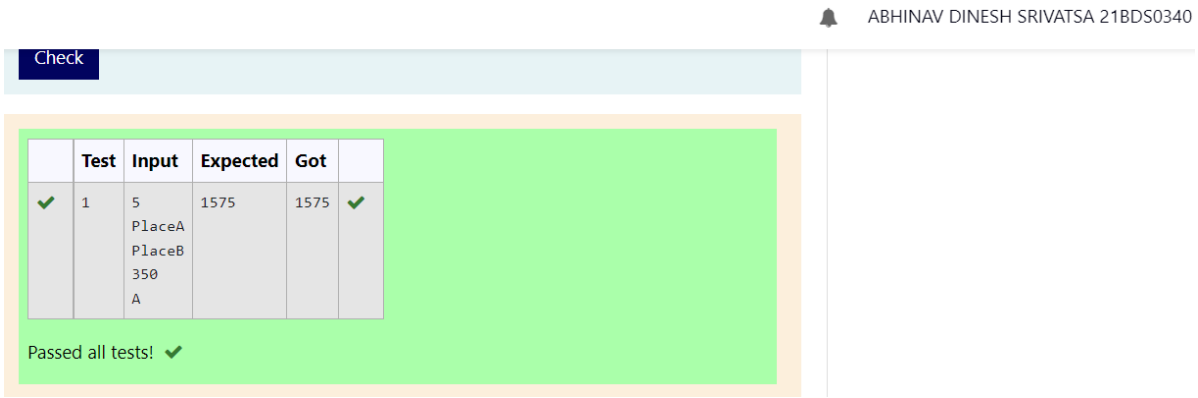
Call Pr's calculate() and pass F and display

Program Code

```
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <iostream>
#include <string.h>
using namespace std;

class Fare
{
    int passengers;
    char from[20];
    char to[20];
    int ticket_cost;
    char cader;

public:
    Fare(int p, char f[20], char t[20], int tc, char c)
    {
        this->passengers = p;
        strcpy(this->from, f);
        strcpy(this->to, t);
        this->ticket_cost = tc;
        this->cader = c;
    }

    friend class Price;
};
```

```cpp
class Price
{
public:
    int calculate(Fare f)
    {
        switch (f.cader)
        {
        case 'A':
            return f.ticket_cost * f.passengers * 0.9;
        case 'B':
            return f.ticket_cost * f.passengers * 0.85;
        case 'C':
            return f.ticket_cost * f.passengers * 0.8;
        }
        return 0;
    }
};

int main()
{
    int p, tc;
    char fr[20], t[20], c;
    cin >> p >> fr >> t >> tc >> c;
    Fare f(p, fr, t, tc, c);
    Price pr;
    cout << pr.calculate(f);
}
```

Output



M6_1

AIM

Create a class named person with attributes name, age, phno with getPerson and printPerson member functions. Extend the class named employee with additional attributes empId, designation along with getEmp and displayEmp member functions. Define an array of employee instances and invoke the respective employee member functions and display only empId of all employees in ascending order.

Algorithm / Pseudocode

Person:

Declare character array Name with 20 spaces

Declare integer Age

Declare character array Phno with 11 spaces

Void getPerson():

Read inputs and assign to Name, Age and Phno

Void printPerson():

Display Name, Age and Phno

Employee, extends Person:

Declare character array Desig with 20 spaces

Declare integer EmpId

Void getEmp():

Call Person's getPerson()

Read input and assign to EmpId and Desig

Void dispEmp():

Call Person's printPerson()

Display EmpId and Desig

Int main():

Declare integer N

Read input and assign as N

Declare Employee array E with N spaces

Loop from 0 to N as X

Call E[X]'s getEmp()

Loop from 0 to N as X

Loop from X to N as Y

If E[X]'s EmpId > E[Y]'s EmpId, then swap them

Loop from 0 to N as X

Display E[X]'s EmpId

Program Code

```
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <iostream>
using namespace std;

class Person
{
    char name[20];
    int age;
    char phno[11];

public:
    void getPerson()
    {
        cin >> this->name >> this->age >> this->phno;
    }

    void printPerson()
    {
        cout << this->name << "\n"
             << this->age << "\n"
```

```
            << this->phno << "\n";
    }
};

class Employee : private Person
{
    char desig[20];

public:
    int empId;

    void getEmp()
    {
        Person::getPerson();
        cin >> this->empId >> this->desig;
    }

    void dispEmp()
    {
        Person::printPerson();
        cout << this->empId << "\n"
             << this->desig << "\n";
    }
};

int main()
{
    int n;
    cin >> n;
    Employee e[n];
    for (int x = 0; x < n; x++)
        e[x].getEmp();
    for (int x = 0; x < n; x++)
        for (int y = x + 1; y < n; y++)
            if (e[x].empId > e[y].empId)
            {
                Employee temp = e[y];
                e[y] = e[x];
                e[x] = temp;
            }
    for (int x = 0; x < n; x++)
        cout << e[x].empId << "\n";
}
```

Output


ABHINAV DINESH SRIVATSA 21BDS0340
20 Read input and assign to EmpId and Desig
21
22 Void dispEmp():
Check
Test Input Expected Got
1 2 Name1 25 9123491234 10005 Manager Name2 22 8123481234 10001 Trainee
10001 10005
10001 10005
Passed all tests!

M6_2

AIM

Define a class named person[name, age, getPerson, displayPerson], extend the class and define a Student class[regno, cgpa, getStudent, displayStudent].

Create a class named GateScore[GateRegistrationNumber, Score, ExamCode, getGate, displayGate].

Develop a class PG_Student[deptName, getPGS, displayPGS] inherited from two parents, Student class and GateScore class.

In main method, create n instance of PG students and invoke all member functions. Find the student and display VIT Regno and GATE regno, who has scored highest Gate Score.

Algorithm / Pseudocode

Person:

Declare character array Name with 20 spaces

Declare integer Age

Void getPerson():

Read inputs and assign to Name and Age

Void displayPerson():

Display Name and Age

Student, extends Person:

Declare character array Regno with 10 spaces

Declare float Cgpa

Void getStudent():

Call getPerson()

Read inputs and assign to Regno and Cgpa

Void displayStudent():

Call displayPerson()

Display Regno and Cgpa

Char* getRegno():

Return Regno

GateScore:

Declare character array GateRegistrationNumber with 20 spaces

Declare integer Score

Declare character array ExamCode with 20 spaces

Void getGate():

Read inputs and assign to GateRegistrationNumber, Score and ExamCode

Void displayGate():

Display GateRegistrationNumber, Score and ExamCode

Char* getGateRegno():

Return GateRegistrationNumber

Int getGateScore():

Return Score

PG_Student, extends Student and GateScore:

```
    Declare character array DeptName with 10 spaces

    Void getPGS():
        Call getStudent()
        Call getGate()
        Read input and assign to DeptName

    Void displayPGS():
        Call displayStudent()
        Call displayGate()
        Display DeptName

Int main():
    Declare integer N
    Read input and assign to N
    Declare PG_Student array Pgs with N spaces
    Loop from 0 to N as X
        Call Pgs[X]'s getPGS()
    Declare integer Max as Pgs[0]'s getGateScore()
    Declare character arrays Regno and GateRegno with 10 and 20 spaces
    Assign Regno as Pgs[0]'s getRegno()
    Assign GateRegno as Pgs[0]'s getGateRegno()
    Loop from 0 to N as X
        If Pgs[X]'s getGateScore() > Max, then
            Assign Max as Pgs[X]'s getGateScore()
            Assign Regno as Pgs[X]'s getRegno()
```

Assign GateRegno as Pgs[X]'s getGateRegno()

Display Regno and GateRegno

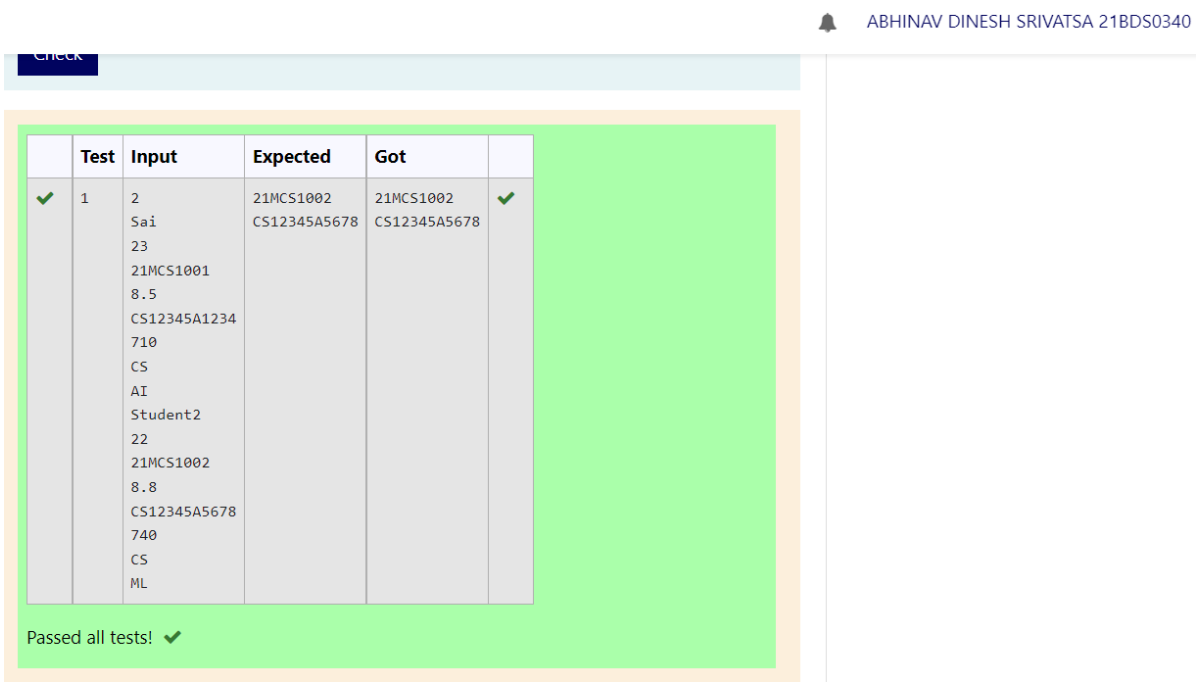
Program Code

```
// 21BDS0340 Abhinav Dinesh Srivatsa

#include <iostream>
#include <string.h>
using namespace std;

class Person
{
    char name[20];
    int age;

public:
    void getPerson()
    {
        cin >> name >> age;
    }

    void displayPerson()
    {
        cout << name << "\n"
             << age << "\n";
    }
};

class Student : public Person
{
    char regno[10];
    float cgpa;

public:
    void getStudent()
    {
        getPerson();
        cin >> regno >> cgpa;
    }

    void displayStudent()
    {
        displayPerson();
        cout << regno << "\n"
             << cgpa << "\n";
    }
```

```
    char *getRegno()
    {
        return this->regno;
    }
};

class GateScore
{
    char GateRegistrationNumber[20];
    int Score;
    char ExamCode[20];

public:
    void getGate()
    {
        cin >> GateRegistrationNumber >> Score >> ExamCode;
    }

    void displayGate()
    {
        cout << GateRegistrationNumber << "\n"
             << Score << "\n"
             << ExamCode << "\n";
    }

    char *getGateRegno()
    {
        return this->GateRegistrationNumber;
    }

    int getGateScore()
    {
        return this->Score;
    }
};

class PG_Student : public Student, public GateScore
{
    char deptName[10];

public:
    void getPGS()
    {
        getStudent();
        getGate();
        cin >> deptName;
    }
```

```
    void displayPgs()
    {
        displayStudent();
        displayGate();
        cout << deptName << "\n";
    }
};

int main()
{
    int n;
    cin >> n;
    PG_Student pgs[n];
    for (int x = 0; x < n; x++)
        pgs[x].getPGS();
    int max = pgs[0].getGateScore();
    char regno[10], gateRegno[20];
    strcpy(regno, pgs[0].getRegno());
    strcpy(gateRegno, pgs[0].getGateRegno());
    for (int x = 0; x < n; x++)
        if (pgs[x].getGateScore() > max)
        {
            max = pgs[x].getGateScore();
            strcpy(regno, pgs[x].getRegno());
            strcpy(gateRegno, pgs[x].getGateRegno());
        }
    cout << regno << "\n"
         << gateRegno << "\n";
}
```

Output


ABHINAV DINESH SRIVATSA 21BDS0340
Check
Test
Input
Expected
Got
1
2
Sai
23
21MCS1001
8.5
CS12345A1234
710
CS
AI
Student2
22
21MCS1002
8.8
CS12345A5678
740
CS
ML
21MCS1002
CS12345A5678
21MCS1002
CS12345A5678
Passed all tests!