Programming Fundamentals Lab
Lab Assignment 07

Course Code: CL1002

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Task 01

You are responsible for the logistics of various types of cargo. Depending on the weight of each cargo, you need a different vehicle, and this will cost a different price per ton:

1. Up to 3 tons – a minibus ($200 per ton).
2. From over 3 and up to 11 tons – truck ($175 per ton).
3. Over 11 tons – train ($120 per ton).

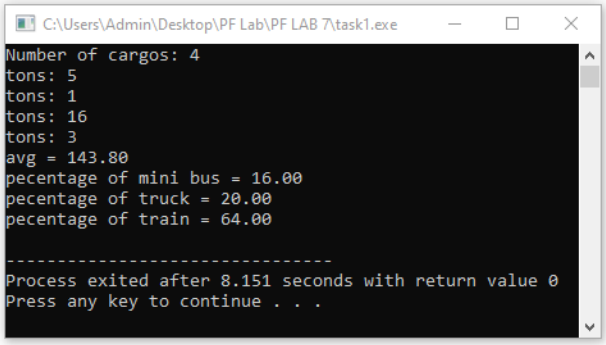
Your task is to calculate the average price per ton of the cargo, and also what percentage of the cargo is transported in each vehicle.

task1.cpp

```c
#include<stdio.h>
int main(){
int ton,cargos;
float mini,truck,train,totalton;
float perc_mini,perc_truck,perc_train,avg;
    printf("Number of cargos: ");
    scanf("%d",&cargos);

    while(cargos!=0){
        printf("tons: ");
        scanf("%d",&ton);
        if(ton>0 && ton<=3)
        mini = mini + ton;
        else if (ton>3 && ton<=11)
        truck = truck + ton;
        else if (ton>11)
        train = train + ton;
        else printf("invalid input..");
        cargos--;
    }
    totalton=mini+truck+train;
    avg = (mini*200+truck*175+train*120)/totalton;
    perc_mini= (mini/totalton)*100;
    perc_truck= (truck/totalton)*100;
    perc_train= (train/totalton)*100;

    printf("avg = %0.2f\n",avg);
    printf("pecentage of mini bus = %0.2f\n",perc_mini);
    printf("pecentage of truck = %0.2f\n",perc_truck);
    printf("pecentage of train = %0.2f\n",perc_train);
}
```



Task 02

For a certain period of time, patients arrive at the hospital every day for an examination. It has initially 7 doctors. Each doctor can treat only one patient per day, but sometimes there is a shortage of doctors, so the remaining patients are sent to other hospitals. Every third day the hospital makes calculations and if the count of untreated patients is greater than the count of treated ones, another doctor is appointed.

Write a program, that calculates for a given period of time, the count of treated and untreated patients.

task9.c task2.c

```c
#include<stdio.h>
int main()
{
int doc=7,i=1,doctor=0,patients,treated=0,untreated=0,days,tot_untreated=0;

printf("Enter number of days: ");
scanf("%d", &days);
while(i<=days){
    printf("enter number of patients today\n");
    scanf("%d",&patients);
    if ((i%3==0) && (tot_untreated>treated)){
    doc=doc+1;
    doctor=doctor+1;
    }
    if (patients>doc){
    treated = treated + doc;
    untreated =  patients - doc;
    tot_untreated = tot_untreated + untreated;
    }
    else {
    treated=treated+patients;
    }
    i++;
}
printf("untreated patients are %d\n",tot_untreated);
printf("treated patients are %d\n",treated);
printf("Number of doctors appointed are %d\n",doctor);
printf("Number of doctors are %d\n",doc);
}

```

```
C:\Users\Admin\Desktop\PF Lab\PF LAB 7\task2.exe
Enter number of days: 7
enter number of patients today
9
enter number of patients today
27
enter number of patients today
6
enter number of patients today
25
enter number of patients today
16
enter number of patients today
20
enter number of patients today
2
untreated patients are 58
treated patients are 47
Number of doctors appointed are 2
Number of doctors are 9

--------------------------------
Process exited after 46.75 seconds with return value 24
Press any key to continue . . .
```

Task 03

Sara is N years old. For each birthday she receives a present. For each odd birthday (1, 3, 5, ..., n) she receives toys, and for each even birthday (2, 4, 6, ..., n) she receives money. For her second birthday she received Rs. 100, and the amount is increased by Rs 200 for each following even birthday. Over the years Sara has secretly saved her money. Sara's brother, in the years when she received money, took Rs. 30 from each of the amounts. Sara has sold the toys, received over the years, each one for Rs. 130 USD and added the sum to the amount of saved money. With the money she wanted to buy a washing machine for Rs 10,000. Write a program that calculates how much money she has saved and if it is enough to buy a washing machine.

task3.c

```c
#include<stdio.h>
main(){
int age, toys, even_bday=0, i, money, toy_money, sum, WashMach=10000;
printf("Enter age of Sara: ");
scanf("%d",&age);

    for(i=1;i<=age;i++){
    if (i%2==0){
        money+=100+((even_bday*200)-30);
        even_bday++;
    }
    else {
        toys++;
        toy_money=toys*130;
        }
    sum=toy_money + money;
        }

printf("Price of washing machine: %d\nMoney she saved over the years: %d\n",WashMach,sum);

if (sum>=WashMach)
    printf("Sufficient money to buy Washing Machine...\n");
else
    printf("Not enough money to buy Washing Machine...\n");
}
```

```
C:\Users\Admin\Desktop\PF Lab\PF LAB 7\task3.exe
Enter age of Sara: 20
Price of washing machine: 10000
Money she saved over the years: 11000
Sufficient money to buy Washing Machine...

--------------------------------
Process exited after 4.422 seconds with return value 0
Press any key to continue . . .
```

Task 04

We have n integer numbers within the range of [1 ... 1000]. Some percent of them p1 are under 200, another percent p2 are from 200 to 399, percent p3 are from 400 to 599, percent p4 are from 600 to 799 and the rest p5 percent are from 800 upwards. Write a program that calculates and prints the percentages p1, p2, p3, p4 and p5.

task2.c task4.c

```c
#include<stdio.h>
main(){
    int i,intcount,num, c1=0,c2=0,c3=0,c4=0,c5=0;
    float p1,p2,p3,p4,p5;
    printf("Enter number of integers: ");
    scanf("%d",&intcount);

    for(i=1;i<=intcount;i++){
    printf("Enter integer: ");
    scanf("%d",&num);
        if ((num>0) && (num<200))
        c1+=1;
        if ((num>=200) && (num<400))
        c2+=1;
        if ((num>=400) && (num<600))
        c3+=1;
        if ((num>=600) && (num<800))
        c4+=1;
        if ((num>=800) && (num<=1000))
        c5+=1;
    }
    p1=(c1*100.0)/intcount;
    p2=(c2*100.0)/intcount;
    p3=(c3*100.0)/intcount;
    p4=(c4*100.0)/intcount;
    p5=(c5*100.0)/intcount;
    printf("Percentage of p1 is %0.2f%%\n",p1);
    printf("Percentage of p2 is %0.2f%%\n",p2);
    printf("Percentage of p3 is %0.2f%%\n",p3);
    printf("Percentage of p4 is %0.2f%%\n",p4);
    printf("Percentage of p5 is %0.2f%%\n",p5);
}
```

```
C:\Users\Admin\Desktop\PF Lab\PF LAB 7\task4.exe
Enter number of integers: 6
Enter integer: 100
Enter integer: 350
Enter integer: 500
Enter integer: 700
Enter integer: 900
Enter integer: 200
Percentage of p1 is 16.67%
Percentage of p2 is 33.33%
Percentage of p3 is 16.67%
Percentage of p4 is 16.67%
Percentage of p5 is 16.67%

--------------------------------
Process exited after 43.59 seconds with return value 27
Press any key to continue . . .
```

Task 05

The factorial of n (written n!) is the product of the integers between 1 and n. Thus 4! = 1*2*3*4 = 24 or 4! = 4*3*2*1 = 24. By definition, 0! = 1. Factorial is not defined for negative numbers. Write a program that asks the user for a non-negative integer and computes and prints the factorial of that integer. You will need to perform the following tasks.

1. Your program should check to see if the user entered a negative number. If so, the program should print a message saying that a nonnegative number is required and ask the user the enter another number. The program should keep doing this until the user enters a nonnegative number, after which it should compute the factorial of that number.

2. You can use any loop you like to calculate the factorial.

3. Your program should also check what should happen if the user enters 0.

4. Your output should be in the following format.

task5.c

```c
#include<stdio.h>
main()
{
 int i,factorial=1,number;
    do{
        printf("Enter a non negative number: ");
        scanf("%d",&number);
        if(number<0)
            printf("\nNon negative number is required. Please enter again.\n\n");

        else if(number==0)
            printf("\nFactorial of 0 is: 1\n");

        else{
        for(i=1;i<=number;i++){
            factorial=factorial*i;}
        }
}   while (number<0);
    printf("\nFactorial of %d is: %d\n",number,factorial);
}
```

```
C:\Users\Admin\Desktop\PF Lab\PF LAB 7\task5.exe
Enter a non negative number: -5

Non negative number is required. Please enter again.

Enter a non negative number: 8

Factorial of 8 is: 40320

--------------------------------
Process exited after 11.21 seconds with return value 26
Press any key to continue . . .
```

Task 06

Ali is 18 years old and receives an inheritance that consists of Rs. 2,00,000. He decides to return Rs. 1,00,000, but does not know if the left money will be enough to live without working for 5 years. Write a program that calculates if Ali will have enough money to not have to work for 5 years. Assuming that for every even year he will spends Rs. 25,563. For every odd year he spends (even year + 12,580).

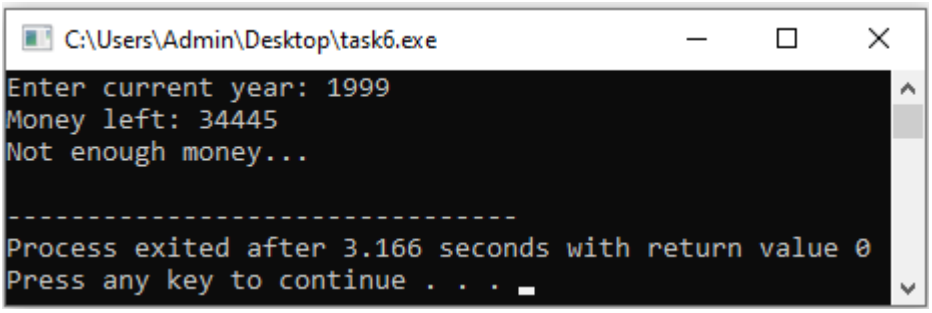
task6.c

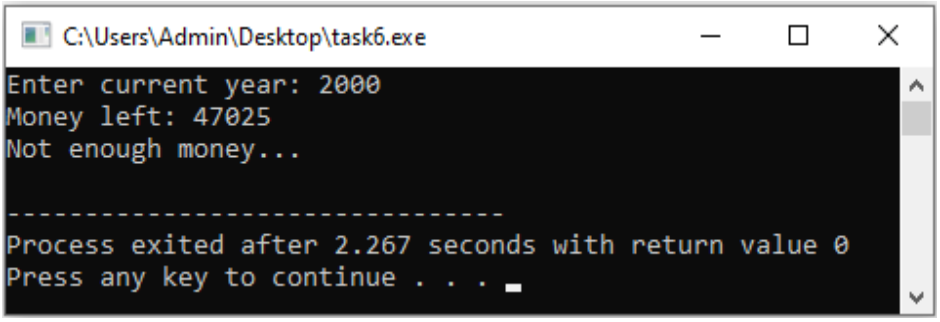
```c
#include<stdio.h>
main(){

    int x, year,yeartolive,money=200000;
    printf("Enter current year: ");
    scanf("%d",&year);
    yeartolive = year+4;

    do{
        if(year%2==0)
            money=money-25563;
        else
            money=money-(25563+12580);
    year++;
    }while(year<=yeartolive);

    printf("Money left: %d\n",money);
    if (money>=100000)
        printf("Ali has enough money...\n");
    else
        printf("Not enough money...\n");
}
```





Task 07

Write a program that repeatedly asks the user to enter two money amounts expressed in Rupees and Paisas. The program should then add the two amounts and display the answer, again in Rupees and Paisas. Use a do while loop that asks the user whether the program should be terminated.

task9.c task7.c

```c
#include<stdio.h>
main(){
int r1,r2,p1,p2,paisa,rupees;char response;
do{
printf("Enter RUPEES of first amount: ");
scanf("%d",&r1);
printf("Enter Paisas of first amount: ");
scanf("%d",&p1);
printf("Enter RUPEES of second amount: ");
scanf("%d",&r2);
printf("Enter Paisas of second amount: ");
scanf("%d",&p2);
paisa=p1+p2;
rupees=r1+r2;
if (paisa>=100){
    rupees++;
    paisa-=100;
    printf("total amount is:  %d.%d\n",rupees,paisa);
    }
else printf("total amount is:  %d.%d\n",rupees,paisa);

printf("\nDo you wish to continue? (y/n)");
fflush(stdin);
scanf("%c",&response);

}while(response=='y' || response=='Y');

}
```

```
C:\Users\Admin\Desktop\PF Lab\PF LAB 7\task7.exe
Enter RUPEES of first amount: 15
Enter Paisas of first amount: 69
Enter RUPEES of second amount: 15
Enter Paisas of second amount: 45
total amount is:  31.14

Do you wish to continue? (y/n)y
Enter RUPEES of first amount: 15
Enter Paisas of first amount: 20
Enter RUPEES of second amount: 16
Enter Paisas of second amount: 80
total amount is:  32.0

Do you wish to continue? (y/n)n

--------------------------------
Process exited after 30.3 seconds with return value 110
Press any key to continue . . .
```

Task 08

File Guess.c below contains a skeleton for a program to play a guessing game with the user. The program randomly generates an integer between 1 and 10, then ask the user to try to guess the number. If the user guesses incorrectly, the program should ask them to try again until the guess is correct; when the guess is correct, the program should print a congratulatory message.

1. Using the comments as a guide, complete the program so that it plays the game as described above.

2. Modify the program so that if the guess is wrong, the program says whether it is too high or too low. You will need an if statement (inside your loop) to do this.

3. Now add code to count how many guesses is remaining to the user to get the number, and print this number at the end with the congratulatory message. (You can give user 3 chances to guess)

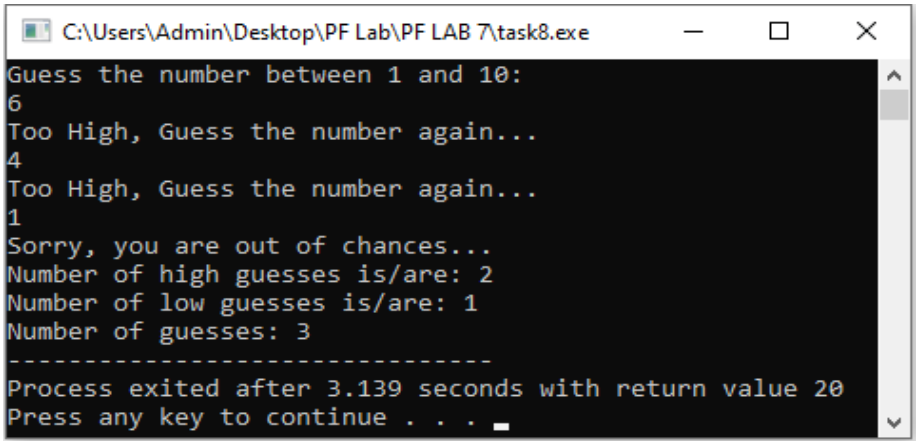
4. Finally, count how many of the guesses are too high and how many are too low. Print these values, along with the total number of guesses, when the user finally guesses correctly.

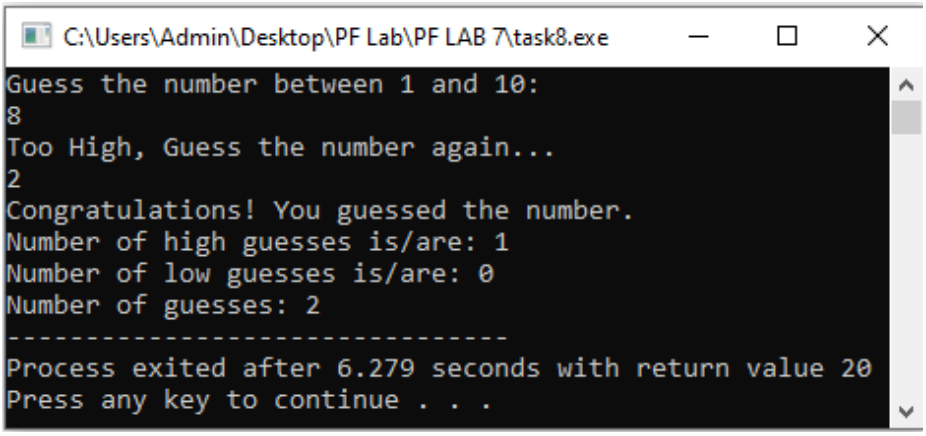
task8.c

```c
#include<stdio.h>
#include<stdlib.h>
main(){
int numToGuess;
int guess, too_high, too_low, totalguesses;

numToGuess = rand() % 10 + 1;

printf("Guess the number between 1 and 10:\n");
scanf("%d", &guess);
totalguesses++;
while (guess != numToGuess){
    if (guess<numToGuess){
    too_low+=1;
    printf("Too low, Guess the number again...\n");
    }
    else if (guess>numToGuess){
    too_high+=1;
    printf("Too High, Guess the number again...\n");
    }
    scanf("%d", &guess);
    totalguesses++;
    if(totalguesses==3)
    break;
    }
if(guess==numToGuess)
printf("Congratulations! You guessed the number.\n");
else
printf("Sorry, you are out of chances...\n");
printf("Number of high guesses is/are: %d\n",too_high);
printf("Number of low guesses is/are: %d\n",too_low);
printf("Number of guesses: %d", totalguesses);
}
```





Task 09

It's almost election day and the election officials need a program to help tally election results. There are two candidates for office — Candidate A and Candidate B. The program's job is to take as input the number of votes each candidate received in each voting district and find the total number of votes for each. The program should print out the final tally for each candidate— both the total number of votes each received and the percent of votes each received. You should perform the following tasks;

1. Add the code to control the loop. You may use either a while loop or a do...while loop. The loop must be controlled by asking the user whether or not there are more districts to report (Consider there are 7 districts (D1, D2, D3, D4, D5, D6, D7) in which the elections are being held). The user should answer with the character y or n though your program should also allow uppercase responses.

2. Add the code to read in the votes for each candidate and find the total votes. Print out the total number of votes from all districts and the percentages.

3. Also display the number of votes both candidates got from each districts with percentages.

4. The election officials want more information. They want to know how many districts each candidate won. Add code to compute and print this. You need three new variables: one to count the number of districts won by Candidate A, one to count the number won by Candidate B, and one to count the number of ties.

[*] task9.c

```c
#include<stdio.h>
main(){
char response;
int d=1,voteA=0,voteB=0,A=0,B=0,T=0;int totalA=0,totalB=0,total,grandtotal;
float percA,percB;
do{
printf("\nEnter votes of Candidate A: ");
scanf("%d",&voteA);
printf("Enter votes of Candidate B: ");
scanf("%d",&voteB);
if(voteA>voteB)
    A+=1;
else if(voteB>voteA)
    B+=1;
else
    T+=1;
total=voteA+voteB;
printf("Total votes candidate A got from District %d are %d\n",d,voteA);
printf("Total votes candidate B got from District %d are %d\n",d,voteB);
percA=(voteA*100.0)/total;
percB=(voteB*100.0)/total;
printf("Percentage of votes Candidate A got from district %d is: %0.2f%%\n",d,percA);
printf("Percentage of votes Candidate B got from district %d is: %0.2f%%\n",d,percB);d++;

totalA+=voteA;
totalB+=voteB;
grandtotal+=total;
    printf("Are there more districts to report?(y/n):  ");
fflush(stdin);
    scanf("%c",&response);
}while (response=='y' || response=='Y');

percA=(totalA*100.0)/grandtotal;
percB=(totalB*100.0)/grandtotal;
printf("\nTotal votes Candidate A got: %d\n",totalA);
printf("Total votes Candidate B got: %d\n",totalB);
printf("total votes across all districts: %d\n",grandtotal);
printf("Percentage of votes Candidate A got from all district is: %0.2f%%\n",percA);
printf("Percentage of votes Candidate B got from all district is: %0.2f%%\n",percB);
printf("Districts won by A: %d\n",A);
printf("Districts won by B: %d\n",B);
printf("Districts tied between A and B: %d\n",T);
}
```

OUTPUT ON NEXT PAGE

C:\Users\Admin\Desktop\PF Lab\PF LAB 7\task9.exe

```
Enter votes of Candidate A: 500
Enter votes of Candidate B: 400
Total votes candidate A got from District 1 are 500
Total votes candidate B got from District 1 are 400
Percentage of votes Candidate A got from district 1 is: 55.56%
Percentage of votes Candidate B got from district 1 is: 44.44%
Are there more districts to report?(y/n):  y

Enter votes of Candidate A: 600
Enter votes of Candidate B: 900
Total votes candidate A got from District 2 are 600
Total votes candidate B got from District 2 are 900
Percentage of votes Candidate A got from district 2 is: 40.00%
Percentage of votes Candidate B got from district 2 is: 60.00%
Are there more districts to report?(y/n):  Y

Enter votes of Candidate A: 500
Enter votes of Candidate B: 500
Total votes candidate A got from District 3 are 500
Total votes candidate B got from District 3 are 500
Percentage of votes Candidate A got from district 3 is: 50.00%
Percentage of votes Candidate B got from district 3 is: 50.00%
Are there more districts to report?(y/n):  n

Total votes Candidate A got: 1600
Total votes Candidate B got: 1800
total votes across all districts: 3400
Percentage of votes Candidate A got from all district is: 47.06%
Percentage of votes Candidate B got from all district is: 52.94%
Districts won by A: 1
Districts won by B: 1
Districts tied between A and B: 1

--------------------------------
Process exited after 39.53 seconds with return value 34
Press any key to continue . . .
```