

Question 1

Write a C++ program to ask user to enter his/her average marks in DCS1101. The program prints "You pass" if a student's average marks is 50 and above, otherwise display "You Fail".

```
1 // Question 1
2
3 #include <iostream>
4 using namespace std;
5
6 int main()
7 {
8     double avg;
9
10    // infinite loop while avg less than 0 or more than 100
11    do{
12        cout << "Enter your average mark: ";
13        cin >> avg;
14
15        if(avg < 0 || avg > 100)
16            cout << "Invalid average mark.\n" << endl;
17    }
18    while(avg < 0 || avg > 100);
19
20    if(avg >= 50)
21        cout << "\nYou pass." << endl;
22    else
23        cout << "\nYou fail." << endl;
24
25    return 0;
26 }
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 1.exe
Enter your average mark: 10

You fail.

-----
Process exited after 6.796 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 1.exe
Enter your average mark: 90

You pass.

-----
Process exited after 0.9598 seconds with return value 0
Press any key to continue . . .
```

Sample program run 3:

```
C:\Users\User\Downloads\Lab 5 Question\Question 1.exe
Enter your average mark: 50

You pass.

-----
Process exited after 0.7715 seconds with return value 0
Press any key to continue . . .
```

Validation:

```
C:\Users\User\Downloads\Lab 5 Question\Question 1.exe
Enter your average mark: -1
Invalid average mark.

Enter your average mark: 101
Invalid average mark.

Enter your average mark: 100.00001
Invalid average mark.

Enter your average mark: -0.000001
Invalid average mark.

Enter your average mark: 33

You fail.

-----
Process exited after 21.51 seconds with return value 0
Press any key to continue . . .
```

Question 2

Write a C++ program to ask user input the age of Sam and Ryan. The program shall determine who is younger or they have same age.

```
1 // Question 2
2
3 #include <iostream>
4 using namespace std;
5
6 int main()
7 {
8     int aS, aR;
9
10    // infinite loop while age is wrong
11    do{
12        cout << "Enter the age of Sam and Ryan: ";
13        cin >> aS >> aR;
14
15        if(aS < 0 || aS > 150 || aR < 0 || aR > 150)
16            cout << "Invalid age.\n" << endl;
17    }
18    while(aS < 0 || aS > 150 || aR < 0 || aR > 150);
19
20    if(aS == aR)
21        cout << "Sam and Ryan have same age." << endl;
22    else if (aS > aR)
23        cout << "Ryan is younger than Sam." << endl;
24    else
25        cout << "Sam is younger than Ryan" << endl;
26
27    return 0;
28
29 }
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 2.exe
Enter the age of Sam and Ryan: 10 20
Sam is younger than Ryan

-----
Process exited after 11.02 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 2.exe
Enter the age of Sam and Ryan: 25 18
Ryan is younger than Sam.

-----
Process exited after 1.947 seconds with return value 0
Press any key to continue . . .
```

Sample program run 3:

```
C:\Users\User\Downloads\Lab 5 Question\Question 2.exe
Enter the age of Sam and Ryan: 19 19
Sam and Ryan have same age.

-----
Process exited after 4.417 seconds with return value 0
Press any key to continue . . .
```

Validation:

```
C:\Users\User\Downloads\Lab 5 Question\Question 2.exe
Enter the age of Sam and Ryan: -1 10
Invalid age.

Enter the age of Sam and Ryan: -1 151
Invalid age.

Enter the age of Sam and Ryan: 10 151
Invalid age.

Enter the age of Sam and Ryan: 100 101
Sam is younger than Ryan

-----
Process exited after 41.54 seconds with return value 0
Press any key to continue . . .
```

Question 3

Write a C++ program to calculate the total expenses. Quantity and price per item are input by the user and discount of 10% is offered if the expenses is more than RM50.

```
1 // Question 3
2
3 #include <iostream>
4 #include <iomanip>
5 using namespace std;
6
7 int main()
8 {
9     int q;    // quantity
10    double p;  // price
11    cout << setprecision(2) << fixed;
12
13    // infinite loop while quantity less than 0
14    // or price is 0 or lesser
15    do{
16        cout << "Enter the quantity and price of the item: ";
17        cin >> q >> p;
18
19        if(q < 0)
20            cout << "\nInvalid quantity." << endl;
21        else if(p <= 0)
22            cout << "\nInvalid price." << endl;
23    }
24    while(q < 0 || p <= 0);
25
26    p = p * q;    // calc price
27
28    // discount 10% for price >= 50
29    if(p >= 50)
30        p = p * 0.9;
31
32    cout << "The total expenses is RM" << p;
33
34    return 0;
35
36 }
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 3.exe
Enter the quantity and price of the item: 10 2.5
The total expenses is RM25.00
-----
Process exited after 11.65 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 3.exe
Enter the quantity and price of the item: 100 1.5
The total expenses is RM135.00
-----
Process exited after 2.284 seconds with return value 0
Press any key to continue . . .
```

Validation:

```
C:\Users\User\Downloads\Lab 5 Question\Question 3.exe
Enter the quantity and price of the item: -1 10

Invalid quantity.
Enter the quantity and price of the item: 1 0

Invalid price.
Enter the quantity and price of the item: 1 200
The total expenses is RM180.00
-----
Process exited after 23.72 seconds with return value 0
Press any key to continue . . .
```

Question 4

(a) Write a C++ program to accept average marks from the user. Display the appropriate message based on the following criteria:

Average	Categories (to display as message)
Above 100	Invalid data
90 - 100	A
80 and Above (but less than 90)	B
60 and Above (but less than 80)	You Pass
Below 60	You Fail

(b) Enhance the program to display "Invalid data" if the average marks is negative value.

```
1 // Question 4
2
3 #include <iostream>
4 using namespace std;
5
6 int main()
7 {
8     double avg;           // average
9     string c;             // categories
10
11     // infinite loop while avg < 0
12     // or avg > 100
13     do{
14         cout << "Please enter your average marks: ";
15         cin >> avg;
16
17         if(avg < 0 || avg > 100)
18             cout << "Invalid data.\n" << endl;
19     }
20     while(avg < 0 || avg > 100);
21
22     // determine categories
23     if(avg >= 90)
24         c = "You obtained grade A.";
25     else if(avg >= 80)
26         c = "You obtained grade B.";
27     else if(avg >= 60)
28         c = "You Pass.";
29     else
30         c = "You Fail.";
31
32     cout << endl << c << endl;
33
34     return 0;
35 }
36
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 4.exe
Please enter your average marks: 90

You obtained grade A.

-----
Process exited after 7.621 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 4.exe
Please enter your average marks: 80

You obtained grade B.

-----
Process exited after 1.642 seconds with return value 0
Press any key to continue . . .
```

Sample program run 3:

```
C:\Users\User\Downloads\Lab 5 Question\Question 4.exe
Please enter your average marks: 60

You Pass.

-----
Process exited after 6.328 seconds with return value 0
Press any key to continue . . .
```

Sample program run 4 + Validation:

```
C:\Users\User\Downloads\Lab 5 Question\Question 4.exe
Please enter your average marks: -1
Invalid data.

Please enter your average marks: 101
Invalid data.

Please enter your average marks: 100.0001
Invalid data.

Please enter your average marks: -0.00001
Invalid data.

Please enter your average marks: 23

You Fail.

-----
Process exited after 17.28 seconds with return value 0
Press any key to continue . . .
```


Question 5

Write a C++ program to calculate the gross pay of an education consultant for a month based on the following information given:

- An education consultant will have a basic pay of RM1500
- If the consultant manage to recruite more than 5 students within a month, he will get an additional RM60 for each recruite beyond the 5
- If less than 2 students leave the college within a month, he will entitle for additiaonl bonus of RM100.

```
1 // Question 5
2
3 #include <iostream>
4 #include <iomanip>
5 using namespace std;
6
7 int main()
8 {
9     const int bp = 1500;    // basic pay
10    int r, l, rb, lb, gp;    // declare recruite, leave, recruite bonus, leave bonus and gross pay
11    unsigned int padding;    // for table spacing
12
13    // infinite loop while recruit < 0
14    do{
15        cout << "How many students did you recruited in this month?" << endl;
16        cin >> r;
17
18        if(r < 0)
19            cout << "Invalid number of student. Please try again." << endl;
20    }
21    while(r < 0);
22
23    // infinite loop while leave < 0
24    do{
25        cout << "How many students leave the college within a month?" << endl;
26        cin >> l;
27
28        if(l < 0)
29            cout << "Invalid number of student. Please try again." << endl;
30    }
31    while(l < 0);
32
33    // reward 60 per student after 5 students
34    if(r > 5)
35        rb = 60 * (r - 5);
36    else
```

```

37     rb = 0;
38
39     // reward 100 if leaver < 2
40     if(l < 2)
41         lb = 100;
42     else
43         lb = 0;
44
45     gp = bp + rb + lb;    // total up
46
47     cout << endl << "----- YOUR PAYMENT -----" << endl;
48
49     // output gross pay details
50     cout << "-----" << endl;
51     cout << "|" << setw(padding = 14) << "Salary" << setw(padding = 9) << "|" << setw(padding = 8) << "Amount" << setw(padding = 3) << "|" << endl;
52     cout << "-----" << endl;
53     cout << "|" << setw(padding = 16) << "Basic Pay" << setw(padding = 7) << "|" << setw(padding = 8) << bp << setw(padding = 3) << "|" << endl;
54     cout << "|" << setw(padding = 18) << "Recruite Bonus" << setw(padding = 5) << "|" << setw(padding = 8) << rb << setw(padding = 3) << "|" << endl;
55     cout << "|" << setw(padding = 17) << "Leaver Bonus" << setw(padding = 6) << "|" << setw(padding = 8) << lb << setw(padding = 3) << "|" << endl;
56     cout << "-----" << endl;
57     cout << "|" << setw(padding = 16) << "Gross Pay" << setw(padding = 7) << "|" << setw(padding = 8) << gp << setw(padding = 3) << "|" << endl;
58
59     return 0;
60
61 }

```

Sample program run 1:

```

C:\Users\User\Downloads\Lab 5 Question\Question 5.exe
How many students did you recruited in this month?
3
How many students leave the college within a month?
1
----- YOUR PAYMENT -----
|      Salary      | Amount |
|      Basic Pay   |    1500 |
| Recruite Bonus   |      0 |
|      Leaver Bonus |    100 |
|      Gross Pay   |    1600 |
-----
Process exited after 11.29 seconds with return value 0
Press any key to continue . . .

```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 5.exe
How many students did you recruited in this month?
12
How many students leave the college within a month?
3
----- YOUR PAYMENT -----
|  Salary  | Amount |
|-----|
| Basic Pay | 1500 |
| Recrute Bonus | 420 |
| Leaver Bonus | 0 |
|-----|
| Gross Pay | 1920 |
|-----|
Process exited after 6.167 seconds with return value 0
Press any key to continue . . .
```

Sample program run 3 + Validation:

```
C:\Users\User\Downloads\Lab 5 Question\Question 5.exe
How many students did you recruited in this month?
-1
Invalid number of student. Please try again.
How many students did you recruited in this month?
34
How many students leave the college within a month?
-4
Invalid number of student. Please try again.
How many students leave the college within a month?
0
----- YOUR PAYMENT -----
|  Salary  | Amount |
|-----|
| Basic Pay | 1500 |
| Recrute Bonus | 1740 |
| Leaver Bonus | 100 |
|-----|
| Gross Pay | 3340 |
|-----|
Process exited after 32.05 seconds with return value 0
Press any key to continue . . .
```

Question 6

The local t-shirt shop sells shirts that retail for \$12. Quantity discounts are given as follow:

Number of Shirts Discount

5-10 10%

11-20 15%

21-30 20%

31 or more 25%

Write a program that prompts the user for the number of shirts required and then computes the total price. Make sure the program accepts only nonnegative input.

```
1 // Question 6
2
3 #include <iostream>
4 #include <iomanip>
5 using namespace std;
6
7 int main()
8 {
9     int s; // shirt
10    double p = 12, t; // price, total
11    cout << setprecision(2) << fixed; // output in 2 d.p.
12
13    // infinite loop while s < 0
14    do{
15        cout << "How many shirts would you like?" << endl;
16        cin >> s;
17
18        if(s < 0)
19            cout << "Invalid Input: Please enter a nonnegative integer.\n" << endl;
20    }
21    while(s < 0);
22
23    // determine discount
24    if(s > 30)
25        p = p * 0.75;
26    else if(s > 21)
27        p = p * 0.80;
28    else if(s > 11)
29        p = p * 0.85;
30    else if(s > 4)
31        p = p * 0.90;
32    else
33        p = p * 1.00;
34
35    t = s * p; // calc total
36
37    cout << "The cost per shirt is $" << p << " and the total cost is $" << t << endl;
38
39    return 0;
40
41 }
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 6.exe
How many shirts would you like?
4
The cost per shirt is $12.00 and the total cost is $48.00

-----
Process exited after 6.055 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 6.exe
How many shirts would you like?
0
The cost per shirt is $12.00 and the total cost is $0.00

-----
Process exited after 1.084 seconds with return value 0
Press any key to continue . . .
```

Sample program run 3:

```
C:\Users\User\Downloads\Lab 5 Question\Question 6.exe
How many shirts would you like?
8
The cost per shirt is $10.80 and the total cost is $86.40

-----
Process exited after 1.034 seconds with return value 0
Press any key to continue . . .
```

Sample program run 4 (Validation):

```
C:\Users\User\Downloads\Lab 5 Question\Question 6.exe
How many shirts would you like?
-2
Invalid Input: Please enter a nonnegative integer.

How many shirts would you like?
100
The cost per shirt is $9.00 and the total cost is $900.00

-----
Process exited after 5.753 seconds with return value 0
Press any key to continue . . .
```

Question 7

Write a C++ program by using switch statement. The program shall ask user to input the type of the ticket and quantity, then display the total amount to be paid.

Use the letter given in the bracket to represent the type of the ticket.

Type of Ticket	Price (RM)
Economy Class (E)	450.00
Business Class (B)	650.00
First Class (F)	999.00

```
1 // Question 7
2
3 #include <iostream>
4 #include <iomanip>
5 #include <limits> // get numeric limits
6 #include <ios> // get stream size
7 using namespace std;
8
9 int main()
10 {
11     char x; // type of ticket
12     int q; // quantity
13     double ec = 450, bc = 650, fc = 999, t; // ec price, bc price, fc price
14     cout << setprecision(2) << fixed;
15     unsigned int padding; // for table spacing
16
17     // output ticket details
18     cout << " " << endl;
19     cout << " | " << setw(padding = 16) << "Type of Ticket" << setw(padding = 5)
20     << " | " << setw(padding = 11) << "Price (RM)" << setw(padding = 2) << " | " << endl;
21     cout << " " << endl;
22     cout << " | " << setw(padding = 18) << "Economy Class (E)" << setw(padding = 3) << " | " << setw(padding = 9) << ec << setw(padding = 4) << " | " << endl;
23     cout << " | " << setw(padding = 19) << "Business Class (B)" << setw(padding = 2) << " | " << setw(padding = 9) << bc << setw(padding = 4) << " | " << endl;
24     cout << " | " << setw(padding = 17) << "First Class (F)" << setw(padding = 4) << " | " << setw(padding = 9) << fc << setw(padding = 4) << " | " << endl;
25
26     // infinite loop while x is not E, B or F
27     do{
28         cout << "\nPlease choose a type of ticket: ";
29         cin >> x;
30         cin.ignore(numeric_limits<streamsize>::max(), '\n'); // fetch first char only - prevent execute all
31
32         if(x != 'E' && x != 'B' && x != 'F')
33             cout << "Please choose either 'E', 'B' or 'F'." << endl;
34     }
35     while(x != 'E' && x != 'B' && x != 'F');
36
37     // infinite loop while q < 0
38     do{
39         cout << "Please input the quantity of ticket: ";
40         cin >> q;
41
42         if(q < 0)
43             cout << "Invalid quantity.\n" << endl;
44     }
45     while(q < 0);
46
47     // calculate total price based on classes
48     switch(x)
49     {
50     case 'E': t = ec * q;
51               break;
52     case 'B': t = bc * q;
53               break;
54     case 'F': t = fc * q;
55               break;
56     }
57
58     cout << "\nYou need to pay $" << t << " for your " << x << " class ticket/s." << endl;
59
60     return 0;
61 }
62 }
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 7.exe

| Type of Ticket | Price (RM) |
| Economy Class (E) | 450.00 |
| Business Class (B) | 650.00 |
| First Class (F) | 999.00 |

Please choose a type of ticket: E
Please input the quantity of ticket: 3

You need to pay $1350.00 for your E class ticket/s.

-----
Process exited after 3.112 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 7.exe

| Type of Ticket | Price (RM) |
| Economy Class (E) | 450.00 |
| Business Class (B) | 650.00 |
| First Class (F) | 999.00 |

Please choose a type of ticket: B
Please input the quantity of ticket: 7

You need to pay $4550.00 for your B class ticket/s.

-----
Process exited after 3.039 seconds with return value 0
Press any key to continue . . .
```

Sample program run 3:

```
C:\Users\User\Downloads\Lab 5 Question\Question 7.exe

| Type of Ticket | Price (RM) |
| Economy Class (E) | 450.00 |
| Business Class (B) | 650.00 |
| First Class (F) | 999.00 |

Please choose a type of ticket: F
Please input the quantity of ticket: 10

You need to pay $9990.00 for your F class ticket/s.

-----
Process exited after 2.499 seconds with return value 0
Press any key to continue . . .
```

Validation:

C:\Users\User\Downloads\Lab 5 Question\Question 7.exe

Type of Ticket	Price (RM)
Economy Class (E)	450.00
Business Class (B)	650.00
First Class (F)	999.00

Please choose a type of ticket: X

Please choose either 'E', 'B' or 'F'.

Please choose a type of ticket: EBAA

Please input the quantity of ticket: -121

Invalid quantity.

Please input the quantity of ticket: 1

You need to pay \$450.00 for your E class ticket/s.

Process exited after 32.44 seconds with return value 0
Press any key to continue . . .

Question 8

Write a C++ program to provide 2 option menu for the user: Convert Celcius to Fahrenheit and Convert Fahrenheit to Celcius. The program shall perform the conversion based on the option selected.

$$\text{fahrenheit} = (9 / 5) \times \text{celsius} + 32$$

$$\text{celsius} = (\text{fahrenheit} - 32) / (9/5)$$

(Reminder: mixed data type rule eg: $5/2 = 2$, $5.0 / 2 = 2.5$)

```
1 // Question 8
2
3 #include <iostream>
4 #include <iomanip>
5 using namespace std;
6
7 int main()
8 {
9     int x;
10    double celcius, fahrenheit;
11    cout << setprecision(2) << fixed;
12
13    cout << "Conversion Program" << endl;
14    cout << "1. Convert Celcius to Fahrenheit" << endl;
15    cout << "2. Convert Fahrenheit to Celcius" << endl;
16
17    // infinite loop while x is not 1 or 2
18    do{
19        cout << "\nPlease enter an option: ";
20        cin >> x;
21
22        if(x != 1 && x!= 2)
23            cout << "Invalid option" << endl;
24    }
25    while(x != 1 && x!= 2);
26
27    // execution of selection
28    if(x == 1)
29    {
30        cout << "\nEnter the temperature in Celcius: ";
31        cin >> celcius;
32
33        fahrenheit = (9.0 / 5) * celcius + 32;
34
35        cout << celcius << " Celcius is " << fahrenheit << " Fahrenheit" << endl;
36    }
37    else
38    {
39        cout << "\nEnter the temperature in Fahrenheit: ";
40        cin >> fahrenheit;
41
42        celcius = (fahrenheit - 32) / (9.0 / 5);
43
44        cout << fahrenheit << " Fahrenheit is " << celcius << " celcius" << endl;
45    }
46
47    return 0;
48
49 }
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 8.exe
Conversion Program
1. Convert Celcius to Fahrenheit
2. Convert Fahrenheit to Celcius

Please enter an option: 1

Enter the temperature in Celcius: 100
100.00 Celcius is 212.00 Fahrenheit

-----
Process exited after 8.647 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 8.exe
Conversion Program
1. Convert Celcius to Fahrenheit
2. Convert Fahrenheit to Celcius

Please enter an option: 2

Enter the temperature in Fahrenheit: 300
300.00 Fahrenheit is 148.89 celcius

-----
Process exited after 2.131 seconds with return value 0
Press any key to continue . . .
```

Validation:

```
C:\Users\User\Downloads\Lab 5 Question\Question 8.exe
Conversion Program
1. Convert Celcius to Fahrenheit
2. Convert Fahrenheit to Celcius

Please enter an option: 3
Invalid option

Please enter an option: 0
Invalid option

Please enter an option: 123
Invalid option

Please enter an option: 2

Enter the temperature in Fahrenheit: -1
-1.00 Fahrenheit is -18.33 celcius

-----
Process exited after 10.68 seconds with return value 0
Press any key to continue . . .
```

Question 9

Write a C++ program to calculate the monthly telephone bills based on the following criteria:

Minimum RM50 for up to 100 calls.

Plus RM0.60 per call for next 50 calls.

Plus RM0.50 per call for next 30 calls.

Plus RM0.40 per call for any call beyond 180 calls.

```
1 // Question 9
2
3 #include <iostream>
4 #include <iomanip>
5 using namespace std;
6
7 int main()
8 {
9     int c;           // calls
10    double bp = 50, p, b; // base price, price, tel bill
11    cout << setprecision(2) << fixed;
12
13    // infinite loop while calls < 0
14    do{
15        cout << "Enter the total calls: ";
16        cin >> c;
17
18        if(c < 0)
19            cout << "Invalid input\n" << endl;
20    }
21    while(c < 0);
22
23    // calc tel bill
24    if(c <= 100)
25        b = bp;
26    else if(c <= 150)
27        b = bp + 0.6 * (c - 100);
28    else if(c <= 180)
29        b = bp + 0.6 * 50 + 0.5 * (c - 150);
30    else
31        b = bp + 0.6 * 50 + 0.5 * 30 + 0.4 * (c - 180);
32
33    cout << "Your telephone bill is RM" << b << endl;
34
35    return 0;
36
37 }
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 9.exe
Enter the total calls: 90
Your telephone bill is RM50.00

-----
Process exited after 15.03 seconds with return value 0
Press any key to continue . . .
```

Sample program 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 9.exe
Enter the total calls: 100
Your telephone bill is RM50.00

-----
Process exited after 1.892 seconds with return value 0
Press any key to continue . . .
```

Sample program 3:

```
C:\Users\User\Downloads\Lab 5 Question\Question 9.exe
Enter the total calls: 130
Your telephone bill is RM68.00

-----
Process exited after 1.664 seconds with return value 0
Press any key to continue . . .
```

Sample program run 4:

```
C:\Users\User\Downloads\Lab 5 Question\Question 9.exe
Enter the total calls: 150
Your telephone bill is RM80.00

-----
Process exited after 1.185 seconds with return value 0
Press any key to continue . . .
```

Sample program run 5:

```
C:\Users\User\Downloads\Lab 5 Question\Question 9.exe
Enter the total calls: 170
Your telephone bill is RM90.00

-----
Process exited after 0.9094 seconds with return value 0
Press any key to continue . . .
```

Sample program run 6:

```
C:\Users\User\Downloads\Lab 5 Question\Question 9.exe
Enter the total calls: 200
Your telephone bill is RM103.00

-----
Process exited after 1.004 seconds with return value 0
Press any key to continue . . .
```

Validation:

```
C:\Users\User\Downloads\Lab 5 Question\Question 9.exe
Enter the total calls: -5
Invalid input

Enter the total calls: -134
Invalid input

Enter the total calls: 300
Your telephone bill is RM143.00

-----
Process exited after 15.19 seconds with return value 0
Press any key to continue . . .
```

Question 10

Write a C++ program to determine the number of RM25 vouchers and total voucher values a member is entitled to based on the member's total spending in the recent member day event in a shopping mall. For each RM200 spending, the member will be given one RM25 voucher. The total spending for more than RM600, additional one RM25 voucher will be given. For example, if the total spending is RM450, then total of 2 RM25 vouchers (total value RM50) will be given. However, if the total spending is RM650, then total of 4 RM25 vouchers (total value RM100) will be given.

```
1 // Question 10
2
3 #include <iostream>
4 #include <iomanip>
5 using namespace std;
6
7 int main()
8 {
9     // counter
10    int y;
11    // spending, voucher requirement, total value of voucher
12    double s, x = 200, z;
13    cout << setprecision(2) << fixed;
14
15    // infinite loop while s < 0
16    do{
17        cout << "How much is your spending?" << endl;
18        cin >> s;
19
20        if(s < 0)
21            cout << "Invalid amount.\n" << endl;
22    }
23    while(s < 0);
24
25    // add 1 voucher for every RM200
26    do{
27        if(s >= x)
28        {
29            y = y + 1;
30            x = x + 200;
31        }
32    }
33    while(s >= x);
34
35    // additional 1 voucher for s >= 600
36    if(s >= 600)
37        y = y + 1;
38
39    // total value of voucher
40    z = y * 25;
41
42    cout << "\nYou will be given " << y << " RM25 vouchers (total value of RM" << z << ")" << endl;
43
44    return 0;
45 }
46
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 10.exe
How much is your spending?
33

You will be given 0 RM25 vouchers (total value of RM0.00)

-----
Process exited after 5.844 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 10.exe
How much is your spending?
200

You will be given 1 RM25 vouchers (total value of RM25.00)

-----
Process exited after 1.668 seconds with return value 0
Press any key to continue . . .
```

Sample program run 3:

```
C:\Users\User\Downloads\Lab 5 Question\Question 10.exe
How much is your spending?
399

You will be given 1 RM25 vouchers (total value of RM25.00)

-----
Process exited after 2.802 seconds with return value 0
Press any key to continue . . .
```

Sample program run 4:

```
C:\Users\User\Downloads\Lab 5 Question\Question 10.exe
How much is your spending?
555

You will be given 2 RM25 vouchers (total value of RM50.00)

-----
Process exited after 1.088 seconds with return value 0
Press any key to continue . . .
```

Sample program run 5:

```
C:\Users\User\Downloads\Lab 5 Question\Question 10.exe
How much is your spending?
600

You will be given 4 RM25 vouchers (total value of RM100.00)

-----
Process exited after 1.046 seconds with return value 0
Press any key to continue . . .
```

Sample program run 6:

```
C:\Users\User\Downloads\Lab 5 Question\Question 10.exe
How much is your spending?
1080

You will be given 6 RM25 vouchers (total value of RM150.00)

-----
Process exited after 3.663 seconds with return value 0
Press any key to continue . . .
```

Validation:

```
C:\Users\User\Downloads\Lab 5 Question\Question 10.exe
How much is your spending?
-1
Invalid amount.

How much is your spending?
-1000
Invalid amount.

How much is your spending?
9998

You will be given 50 RM25 vouchers (total value of RM1250.00)

-----
Process exited after 10.18 seconds with return value 0
Press any key to continue . . .
```


Question 11 (Optional)

A parking charges a RM2.00 minum fee to park for up to three hours. An additioanl RM0.50 per hour for each hour or part thereof in exceess of three hours is charged furthrer. The maxim charge for any given 24-hour period is RM10.00.

Assume that no car parks for longer than 24 hours at a time. Write a program that accepts total hours parked, then calculates and prints the parking charges.

```
1 // Question 11
2
3 #include <iostream>
4 #include <iomanip>
5 #include <cmath>
6 using namespace std;
7
8 int main()
9 {
10     // hours, basic charge, total
11     double h, bc = 2, t;
12     cout << setprecision(2) << fixed;
13
14     // infinite loop while h < 0 or h > 24
15     do{
16         cout << "Total hours parked: ";
17         cin >> h;
18         h = ceil(h); // round up (+1 hour if exceeds)
19
20         if(h < 0 || h > 24)
21             cout << "Invalid hour.\n" << endl;
22     }
23     while(h < 0 || h > 24); // assume no h > 24
24
25     // calculate parking charge
26     if(h <= 3)
27         t = bc;
28     else
29     {
30         t = bc + (h - 3) * 0.5;
31         // hard cap at 10
32         if(t > 10)
33             t = 10;
34     }
35
36     cout << "The parking charges are RM" << t << endl;
37
38     return 0;
39
40 }
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 11.exe
Total hours parked: 3
The parking charges are RM2.00

-----
Process exited after 4.927 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 11.exe
Total hours parked: 3.01
The parking charges are RM2.50

-----
Process exited after 3.886 seconds with return value 0
Press any key to continue . . .
```

Sample program run 3:

```
C:\Users\User\Downloads\Lab 5 Question\Question 11.exe
Total hours parked: 4
The parking charges are RM2.50

-----
Process exited after 1.504 seconds with return value 0
Press any key to continue . . .
```

Sample program run 4:

```
C:\Users\User\Downloads\Lab 5 Question\Question 11.exe
Total hours parked: 4.5
The parking charges are RM3.00

-----
Process exited after 1.239 seconds with return value 0
Press any key to continue . . .
```

Sample program run 5:

```
C:\Users\User\Downloads\Lab 5 Question\Question 11.exe
Total hours parked: 23
The parking charges are RM10.00

-----
Process exited after 2.534 seconds with return value 0
Press any key to continue . . .
```

Validation:

```
C:\Users\User\Downloads\Lab 5 Question\Question 11.exe
Total hours parked: 24.01
Invalid hour.

Total hours parked: 25
Invalid hour.

Total hours parked: 30
Invalid hour.

Total hours parked: -1
Invalid hour.

Total hours parked: 20
The parking charges are RM10.00

-----
Process exited after 21.54 seconds with return value 0
Press any key to continue . . .
```

Question 12 (Optional)

Write a C++ program that will help standard 1 student to learn multiplication. Use rand and srand to produce two positive integers randomly with one digit. The program then display a question such as: How much is 5 times 3 ?. The program will verify the answer entered by the student and prints "Very Good" if the answer is correct, otherwise, prints "Sorry, incorrect answer", then reveal the answer to student.

(Hints: use % to ensure one digit integer)

```
1 // Question 12
2
3 #include <iostream>
4 #include <iomanip>
5 using namespace std;
6
7 int main()
8 {
9     int a, b, x, y;
10
11     srand(time(0));
12     a = (rand() % 12) + 1;
13     b = (rand() % 12) + 1;
14     x = a * b;
15
16     cout << "How much is " << a << " times " << b << " ? ";
17     cin >> y;
18
19     if(y == x)
20         cout << "Very Good." << endl;
21     else
22     {
23         cout << "Sorry, incorrect answer." << endl;
24         cout << a << " x " << b << " = " << x;
25     }
26
27     return 0;
28 }
29 }
```

Sample program run 1:

```
C:\Users\User\Downloads\Lab 5 Question\Question 12.exe
How much is 1 times 5 ? 5
Very Good.
-----
Process exited after 2.54 seconds with return value 0
Press any key to continue . . .
```

Sample program run 2:

```
C:\Users\User\Downloads\Lab 5 Question\Question 12.exe
How much is 11 times 4 ? 234
Sorry, incorrect answer.
11 x 4 = 44
-----
Process exited after 4.781 seconds with return value 0
Press any key to continue . . .
```