

SOFTWARE TESTING LABORATORY			
Course Code	21ISL66	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Total Hours of Pedagogy	24	Total Marks	100
Credits	1	Exam Hours	03
<b>Course Objectives:</b>  CLO 1. Explain the test cases for any given problem CLO 2. Analyze the requirements for the given problem statement. CLO 3. Design the solution and write test cases for the given problem. CLO 4. Construct control flow graphs for the solution that is implemented. CLO 5. Create appropriate document for the software artifact			
	<b>Note: two hours tutorial is suggested for each laboratory sessions.</b>		
	<b>Prerequisite</b>		
	<ul style="list-style-type: none"> <li>Students should be familiar with programming languages like C, C++, Java, Python etc.</li> <li>Usage of IDEs like Eclipse, Netbeans and software testing tools should be introduced</li> </ul>		
<b>Sl. No.</b>	<b>PART A – List of problems for which student should develop program and execute in the Laboratory</b>		
1	Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases and discuss the test results.		
2	Design, develop, code and run the program in any suitable language to implement the NextDate function. Analyze it from the perspective of equivalence class value testing, derive different test cases, execute these test cases and discuss the test results.		
3	Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of decision table-based testing, derive different test cases, execute these test cases and discuss the test results.		
4	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on boundary-value analysis, equivalence class partitioning and decision-table approach and execute the test cases and discuss the results.		
5	Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of dataflow testing, derive different test cases, execute these test cases and discuss the test results.		
6	Design, develop, code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.		
	<b>PART B – Practical Based Learning</b>		
01	Develop a Mini Project with documentation of suitable test-cases and their results to perform automation testing of any E-commerce or social media web page.		
	Suggested Guidelines: <ul style="list-style-type: none"> <li>Create a WebDriver session.</li> <li>Navigate to a Web page.</li> <li>Locate the web elements on the navigated page.</li> <li>Perform an actions on the located elements.</li> <li>Assert the performed actions did the correct thing.</li> <li>Report the results of the assertions.</li> <li>End the session.</li> </ul> Each inputs / data feeds (ex: website, username, password, mobile no, product name, etc.) must be provided through a file linked with code and neither to be entered manually nor to be included in the code Use any software testing tool like selenium, Katalon, etc.,		

## Program 1 (Boundary value for Commission Problem)

**/\* Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of boundary value testing, derive test cases, execute these test cases and discuss the test results \*/**

**/\* Assumption price for lock=45.0, stock=30.0 and barrels=25.0 production limit could sell in a month 70 locks,80 stocks and 90 barrels commission on sales = 10 % <= 1000 and 15 % on 1000 to 1800 and 20 % on above 1800\*/**

```
#include<stdio.h>
int main()
{
    int locks, stocks, barrels, tlocks, tstocks, tbarrels;
    float lprice, sprice, bprice, sales, comm;
    int c1,c2,c3,temp;
    lprice=45.0;
    sprice=30.0;
    bprice=25.0;
    tlocks=0;
    tstocks=0;
    tbarrels=0;
    printf("\nenter the number of locks and to exit the loop enter -1 for locks\n");
    scanf("%d",&locks);
    while(locks!=-1)
    {
        c1=(locks<=0||locks>70);
        printf("enter the number of stocks and barrels\n");
        scanf("%d%d",&stocks,&barrels);
        c2=(stocks<=0||stocks>80);
        c3=(barrels<=0||barrels>90);
        if(c1)
            printf("value of locks not in the range 1..70 ");
        else
        {
            temp=tlocks+locks;
            if(temp>70)
                printf("new total locks =%d not in the range 1..70 so old ",temp);
            else
                tlocks=temp;
        }

        printf("total locks = %d\n",tlocks);

        if(c2)
            printf("value of stocks not in the range 1..80 ");
        else
        {
            temp=tstocks+stocks;
            if(temp>80)
                printf("new total stocks =%d not in the range 1..80 so old ",temp);
            else
```

```

        tstocks=temp;
    }
    printf("total stocks=%d\n",tstocks);

    if(c3)
        printf("value of barrels not in the range 1..90 ");
    else
    {
        temp=tbarrels+barrels;
        if(temp>90)
            printf("new total barrels =%d not in the range 1..90 so old ",temp);
        else
            tbarrels=temp;
    }

    printf("total barrel=%d",tbarrels);
    printf("\nenter the number of locks and to exit the loop enter -1 for locks\n");
    scanf("%d",&locks);
}
printf("\ntotal locks = %d\ntotal stocks=%d\ntotal barrels =%d\n",tlocks,tstocks,tbarrels);
sales = lprice*tlocks+sprice*tstocks+bprice*tbarrels;
printf("\nthetotal sales=%f\n",sales);

if(tlocks>0&& tstocks>0&& tbarrels>0)
{
    if(sales > 1800.0)
    {
        comm=0.10*1000.0;
        comm=comm+0.15*800;
        comm=comm+0.20*(sales-1800.0);
    }
    else if(sales > 1000)
    {
        comm =0.10*1000;
        comm=comm+0.15*(sales-1000);
    }
    else
        comm=0.10*sales;

    printf("the commission is=%f\n",comm);
}
else
    printf(" Commission cannot be calculated \n");
return 0;
}

```

---

**Test Case Name : Boundary Value for Commission Problem****Experiment Number : 1****Test data :** price Rs for lock - 45.0 , stock - 30.0 and barrel - 25.0

sales = total lock \* lock price + total stock \* stock price + total barrel \* barrel price

commission : 10% up to sales Rs 1000 , 15 % of the next Rs 800 and 20 % on any sales in excess of 1800

**Pre-condition :** lock = -1 to exit and  $1 \leq \text{lock} \leq 70$  ,  $1 \leq \text{stock} \leq 80$  and  $1 \leq \text{barrel} \leq 90$ **Brief Description :** The salesperson had to sell at least one complete rifle per month.**CHECKING BOUNDARY VALUE FOR LOCKS, STOCKS AND BARRELS AND COMMISSION****Commission Problem Output Boundary Value Analysis Cases**

Case Id	Description	Input Data			Expected Output		Actual output		Status	Comment
		Total Locks	Total Stocks	Total Barrels	Sales	Comm- ission	Sales	Comm- -ission		
1	Enter the min value for locks, stocks and barrels	1	1	1	100	10				output minimum
2	Enter the min value for 2 items and min +1 for any one item	1	1	2	125	12.5				output minimum +
3		1	2	1	130	13				output minimum +
4		2	1	1	145	14.5				output minimum +
5	Enter the value sales approximately mid value between 100 to 1000	5	5	5	500	50				Midpoint
6	Enter the values to calculate the commission for sales nearly less than 1000	10	10	9	975	97.5				Border point -
7		10	9	10	970	97				Border point -
8		9	10	10	955	95.5				Border point -
9	Enter the values sales exactly equal to 1000	10	10	10	1000	100				Border point
10	Enter the values to calculate the commission for sales nearly greater than 1000	10	10	11	1025	103.75				Border point +
11		10	11	10	1030	104.5				Border point +
12		11	10	10	1045	106.75				Border point +

13	Enter the value sales approximately mid value between 1000 to 1800	14	14	14	1400	160				Midpoint
14	Enter the values to calculate the commission for sales nearly less than 1800	18	18	17	1775	216.25				Border point -
15		18	17	18	1770	215.5				Border point -
16		17	18	18	1755	213.25				Border point -
17	Enter the values sales exactly equal to 1800	18	18	18	1800	220				Border point
18	Enter the values to calculate the commission for sales nearly greater than 1800	18	18	19	1825	225				Border point +
19		18	19	18	1830	226				Border point +
20		19	18	18	1845	229				Border point +
21	Enter the values normal value for lock, stock and barrel	48	48	48	4800	820				Midpoint
22	Enter the max value for 2 items and max - 1 for any one item	70	80	89	7775	1415				Output maximum -
23		70	79	90	7770	1414				Output maximum -
24		69	80	90	7755	1411				Output maximum -
25	Enter the max value for locks, stocks and barrels	70	80	90	7800	1420				Output maximum

### Output Special Value Test Cases

Case Id	Description	Input Data			Expected Output		Actual output			
		Total Locks	Total Stocks	Total Barrels	Sales	Commission	Sales	Commission	Status	Comment
1	Enter the random values such that to calculate commission for sales nearly less than 1000	11	10	8	995	99.5				Border point -
2	Enter the random values such that to calculate commission for sales nearly greater than 1000	10	11	9	1005	100.75				Border point +
3	Enter the random values such that to calculate commission for sales nearly less than 1800	18	17	19	1795	219.25				Border point -
4	Enter the random values such that to calculate commission for sales nearly greater than 1800	18	19	17	1805	221				Border point +

### Program 2 ( Next date program)

**/\* Design, develop, code and run the program in any suitable language to implement the NextDate function. Analyze it from the perspective of equivalence class value testing. Derive different test cases, execute these test cases and discuss the test results. \*/**

```
#include<stdio.h>
int check(int day,int month)
{
    if((month==4||month==6||month==9 ||month==11) && day==31) return 1;
```

```
    else  
        return 0;  
}
```

```

int isleap(int year)
{
    if((year%4==0 && year%100!=0) || year%400==0)
        return 1;
    else
        return 0;
}

int main()
{
    int day,month,year,tomm_day,tomm_month,tomm_year;
    char flag;
    do
    {
        flag='y';
        printf("\nenter the today's date in the form of dd mm yyyy\n");
        scanf("%d%d%d",&day,&month,&year);
        tomm_month=month;
        tomm_year= year;
        if(day<1 || day>31)
        {
            printf("value of day, not in the range 1...31\n");
            flag='n';
        }
        if(month<1 || month>12)
        {
            printf("value of month, not in the range 1....12\n");
            flag='n';
        }
        else if(check(day,month))
        {
            printf("value of day, not in the range day<=30");
            flag='n';
        }
        if(year<=1812 || year>2013)
        {
            printf("value of year, not in the range 1812. .... 2013\n");
            flag='n';
        }
        if(month==2)
        {
            if(isleap(year) && day>29)
            {
                printf("invalid date input for leap year");
                flag='n';
            }
            else if(!(isleap(year))&& day>28)
            {
                printf("invalid date input for not a leap year");
                flag='n';
            }
        }
    }while(flag=='n');
}

```



```

switch (month)
{
    case 1:
    case 3:
    case 5:
    case 7:
    case 8:
    case 10: if(day<31)
                tomm_day=day+1;
            else
            {
                tomm_day=1;
                tomm_month=month+1;
            }
            break;
    case 4:
    case 6:
    case 9:

    case 11: if(day<30)
                tomm_day=day+1;
            else
            {
                tomm_day=1;
                tomm_month=month+1;
            }
            break;

```

```

case 12: if(day<31)
            tomm_day=day+1;
        else
        {
            tomm_day=1;
            tomm_month=1;

            if(year==2013)
            {
                printf("the next day is out of boundary value of year\n");
                tomm_year=year+1;
            }
            else
                tomm_year=year+1;
        }
        break;
case 2:

        if(day<28)
            tomm_day=day+1;
        else if(isleap(year)&& day==28)
            tomm_day=day+1;
        else if(day==28 || day==29)
        {
            tomm_day=1;
            tomm_month=3;
        }
        break;
}

```

```
printf("next day is : %d %d %d",tomm_day,tomm_month,tomm_year);  
return 0;  
}
```

**Test Case Name : Equivalence class test cases for Next date**

**Experiment Number : 2**

**Test data :** Enter the three integer value

**Pre-condition :** Month 1 to 12 , DAY 1 TO 31 AND YEAR 1812 TO 2013

**Valid Cases**

M1 = { month ;  $1 \leq \text{month} \leq 12$  }

D1 = { day :  $1 \leq \text{day} \leq 31$  }

Y1 = { year :  $1812 \leq \text{year} \leq 2013$  }

**Invalid cases**

M2 = { month : month < 1 }

M3 = { month : month > 12 }

D2 = { day : day < 1 }

D3 = { day : day > 31 }

Y2 = { year : year < 1812 }

Y3 = { year : year > 2013 }

**Next date Output Equivalence Class Testing**  
**( Weak and Strong Normal Equivalence Class )**

Case Id	Description	Input Data			Expected Output			Actual output			Status	Comment
		month	day	year	month	day	year	month	day	year		
WN1,SN1	Enter the M1, D1 and Y1 valid cases	6	15	1912	6	16	1912					

---

( Weak Robustness Equivalence Class )

Case Id	Description	Input Data			Expected Output			Actual output			Status	Comment
		month	day	year	month	day	year	month	day	year		
WR1	Enter the M1, D1 and Y1 cases	6	15	1912	6	16	1912					
WR2	Enter the M2 , D1 and Y1 cases	-1	15	1912	Should display the message value of the month not in the range 1..12							
WR3	Enter the M3 ,D1 and Y1 cases	13	15	1912	Should display the message value of the month not in the range 1..12							
WR4	Enter the M1, D2 and Y1 cases	6	-1	1912	Should display the message value of the day not in the range 1..31							
WR5	Enter the M1, D3 and Y1 cases	6	32	1912	Should display the message value of the day not in the range 1..31							
WR6	Enter the M1, D1 and Y2 cases	6	15	1811	Should display the message value of the year not in the range 1812..2013							
WR7	Enter the M1, D1 and Y3 cases	6	15	2014	Should display the message value of the year not in the range 1812..2013							

**(Strong Robustness Equivalence Class )**

Case Id	Description	Input Data			Expected Output	Actual Output	Status	Comment
		month	day	year				
SR1	Enter the M2 , D1 and Y1 cases	-1	15	1912	Should display the message value of the month not in the range 1..12			
SR2	Enter the M1, D2 and Y1 cases	6	-1	1912	Should display the message value of the day not in the range 1..31			
SR3	Enter the M1, D1 and Y2 cases	6	15	1811	Should display the message value of the year not in the range 1812..2013			
SR4	Enter the M2 , D2 and Y1 cases	-1	-1	1912	(i)Should display the message value of the month in range 1..12			
					(ii) Should display the message value of the day in range 1..31			
SR5	Enter the M1, D2 and Y2 cases	6	-1	1811	(i) Should display the message value of the day in range 1..31			
					(ii) Should display the message value of the year in range 1812..2013			
SR6	Enter the M2, D1 and Y2 cases	-1	15	1811	(i) Should display the message value of the month in range 1..12			
					(ii) Should display the message value of the year in range 1812..2013			
SR7	Enter the M2, D2 and Y2 cases	-1	-1	1811	(i)Should display the message value of the month in range 1..12			
					(ii) Should display the message value of the day in range 1..31			
					(iii) Should display the message value of the year in range 1812..2013			

### Some addition equivalence Boundary checking

Case Id	Description	Input Data			Expected Output			Actual Output			Status	Comment
		day	month	year	day	month	year	day	month	year		
1	Enter the D1, M1 and Y1 valid cases	31	12	1811	Should display the message value of the year in range 1812..2013							
2	Enter the D1, M1 and Y2 valid cases	31	12	2012	1	1	2013					
3	Enter the D1, M1 and Y3 valid cases	31	12	2013	Should display the message Next is out of boundary 2013							

**3. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of decision table-based testing, derive different test cases, execute these test cases and discuss the test results.**

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

```
int main()
```

```
{
```

```
    int locks, stocks, barrels, tlocks, tstocks, tbarrels; float lprice, sprice, bprice, sales, comm;
```

```
    int c1,c2,c3,temp; lprice=45.0; sprice=30.0; bprice=25.0; tlocks=0; tstocks=0;
```

```
    tbarrels=0;
```

```
    printf("\nEnter the number of locks and to exit the loop enter -1 for locks\n"); scanf("%d",&locks);
```

```
    while(locks!=-1)
```

```
    {
```

```
        c1=(locks<=0||locks>70);
```

```
        printf("Enter the number of stocks and barrels\n"); scanf("%d%d",&stocks,&barrels); c2=(stocks<=0||stocks>80);
```

```
        c3=(barrels<=0||barrels>90);
```

```
        if(c1)
```



```

        printf("value of locks not in the range 1..70 ");
else
{
    temp=tlocks+locks;
    if(temp>70)
        printf("new total locks =%d not in the range 1..70 so old ",temp);
    else
        tlocks=temp;
}

printf("total locks = %d\n",tlocks);

if(c2)
    printf("value of stocks not in the range 1..80 ");
else
{

    temp=tstocks+stocks;
    if(temp>80)
        printf("new total stocks =%d not in the range 1..80 so old ",temp);
    else

```

```

        tstocks=temp;
    }
    printf("total stocks=%d\n",tstocks);

    if(c3)
        printf("value of barrels not in the range 1..90 ");
    else
    {
        temp=tbarrels+barrels;
        if(temp>90)
            printf("new total barrels =%d not in the range 1..90 so old ",temp);
        else
            tbarrels=temp;
    }

    printf("total barrel=%d",tbarrels);
    printf("\nenter the number of locks and to exit the loop enter -1 for locks\n");
    scanf("%d",&locks);
}
printf("\ntotal locks = %d\ntotal stocks=%d\ntotal barrels=%d\n",tlocks,tstocks,tbarrels);
sales = lprice*tlocks+sprice*tstocks+bprice*tbarrels;
printf("\nthe total sales=%f\n",sales);

if(tlocks>0&& tstocks>0&& tbarrels>0)
{
    if(sales > 1800.0)
    {
        comm=0.10*1000.0;
        comm=comm+0.15*800;
        comm=comm+0.20*(sales-1800.0);
    }
    else if(sales > 1000)
    {
        comm =0.10*1000;
        comm=comm+0.15*(sales-1000);
    }
    else
        comm=0.10*sales;

    printf("the commission is=%f\n",comm);
}
else
    printf(" Commission cannot be calculated \n");

```

```

    return 0;
}

```

### Test Case Name :Decision Table for Commission Problem

#### Experiment Number : 3

**Test data :** price Rs for lock - 45.0 , stock - 30.0 and barrel - 25.0

sales = total lock \* lock price + total stock \* stock price + total barrel \* barrel price

commission : 10% up to sales Rs 1000 , 15 % of the next Rs 800 and 20 % on any sales in excess of 1800

**Pre-condition :** lock = -1 to exit and  $1 \leq \text{lock} \leq 70$  ,  $1 \leq \text{stock} \leq 80$  and  $1 \leq \text{barrel} \leq 90$

**Brief Description :** The salesperson had to sell at least one complete rifle per month.

**Input data decision Table**

RULES		R1	R2	R3	R4	R5	R6	R7	R8	R10
Conditions	C1: Locks = -1	T	F	F	F	F	F	F	F	F
	C2 : $1 \leq \text{Locks} \leq 70$	-	T	T	F	T	F	F	F	T
	C3 : $1 \leq \text{Stocks} \leq 80$	-	T	F	T	F	T	F	F	T
	C4 : $1 \leq \text{Barrels} \leq 90$	-	F	T	T	F	F	T	F	T
Actions	a1 : Terminate the input loop	X								
	a2 : Invalid locks input				X		X	X	X	
	a3 : Invalid stocks input			X		X		X	X	
	a4 : Invalid barrels input		X			X	X		X	
	a5 : Calculate total locks, stocks and barrels		X	X	X	X	X	X		X
	a5 : Calculate Sales	X								
	a6: proceed to commission decision table	X								

**Commission calculation Decision Table (Precondition : lock = -1)**

RULES		R1	R2	R3	R4
Condition	C1 : tlocks>0 && tstocks>0 && tbarrels>0	T	T	T	F
	C1 : Sales > 0 AND Sales ≤ 1000	T	F	F	
	C2 : Sales > 1001 AND sales ≤ 1800		T	F	

	C3 : sales $\geq 1801$			T	
Actions	A1 : Cannot calculate the commission				X
	A2 : comm= 10%*sales	X			
	A3 : comm = 10%*1000 + (sales-1000)*15%		X		
	A4 : comm = 10%*1000 + 15% * 800 + (sales-1800)*20%			X	

**Precondition : Initial Value Total Locks= 0 , Total Stocks=0 and Total Barrels=0**

**Precondition Limit :Total locks, stocks and barrels should not exceed the limit 70,80 and 90 respectively**

**NIR-Not in Range**

**SAEO-Same as Expected Output**

**Commission Problem -Decision Table Test cases for input data**

Case Id	Description	Input Data			Output					Actual Output	Status	Comments
		Locks	Stocks	Barrels	Terminate i/p loop	Calculate commission	Total locks	Total stocks	Total Barrels			
1	Enter the value of Locks= -1	-1			yes	0				SAEO	PASS	
2	Enter the valid input for lock and stack and invalid for barrels	20	30	-5		no	20	30	NIR	SAEO	PASS	
3	Enter the valid input for lock and barrels and invalid for stocks	15	-2	45								
4	Enter the valid input for lock and barrels and invalid for stocks	-4	15	16								
5	Enter the valid input for lock and invalid value for stocks and barrels	15	80	100								
6	Enter the valid input for stocks and invalid value for locks and barrels	88	20	99								
7	Enter the valid input for barrels and invalid value for locks and stocks	100	200	25								

### Commission Problem -Decision Table Test cases for commission calculation

L-locks S-  
Stocks  
B-Barrels

Case Id	Description	Input Data			Expected Output				Actual Output	Status	Comments
		L	S	B	Expected Sales	Actual Sales	Expected Commission	Actual Commission			
1	Check the value of sales=0	0	0	0	0	0	0	0	SAEO	PASS	
2	if sales value with in these range( Sales > 0 AND Sales ≤ 1000 )	10	9	10							
3	if sales value with in these range( Sales > 1000 AND Sales ≤ 1800 )	15	15	15							
4	if sales value with in these range( Sales > 1800	20	30	40							

**Precondition : Locks = -1**

#### **Program 4 (Boundary Value and Equivalence Class Analysis Program)**

**/\* Design and develop a program in a language of your choice to solve the triangle problem defined as follows : Accept three integers which are supposed to be the three sides of triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on boundary value analysis, execute the test cases and discuss the results \*/**

```
#include<stdio.h> int main()
{
    int a,b,c,c1,c2,c3; char istriangle; do
    {
        printf("\nEnter 3 integers which are sides of triangle\n"); scanf("%d%d%d",&a,&b,&c);
        printf("\na=%d\tb=%d\tc=%d",a,b,c);
        c1 = a>=1 && a<=10; c2= b>=1 && b<=10; c3= c>=1 && c<=10; if (!c1)
            printf("\nthe value of a=%d is not the range of permitted value",a);
        if (!c2)
```

```
        printf("\nthe value of b=%d is not the range of permitted value",b);
    if (!c3)
        printf("\nthe value of c=%d is not the range of permitted value",c);
} while(!(c1 && c2 && c3));
```

**// To check is it a triangle or not**

```
if( a<b+c && b<a+c && c<a+b )
    istriangle='y';
else
    istriangle='n';
```

**// To check which type of triangle**

```
if (istriangle=='y')
    if ((a==b) && (b==c))
        printf("equilateral triangle\n");
    else if ((a!=b) && (a!=c) && (b!=c))
        printf("scalene triangle\n");
    else
        printf("isosceles triangle\n");
else
    printf("Not a triangle\n");
return 0;
```

```
}
```



---

**Test Case Name :Boundary Value Analysis for triangle problem****Experiment Number : 4****Test Data : Enter the 3 Integer Value( a , b And c )****Pre-condition :  $1 \leq a \leq 10$  ,  $1 \leq b \leq 10$  and  $1 \leq c \leq 10$  and  $a < b + c$  ,  $b < a + c$  and  $c < a + b$** **Brief Description : Check whether given value for a Equilateral, Isosceles , Scalene triangle or can't form a triangle****Triangle Problem -Boundary value Test cases for input data**

Case Id	Description	Input Data			Expected Output	Actual Output	Status	Comments
		a	b	c				
1	Enter the min value for a , b and c	1	1	1	Should display the message Equilateral triangle	Equilateral	PASS	a=b=c
2	Enter the min value for 2 items and min +1 for any one item1	1	1	2	Message should be displayed can't form a triangle			
3	Enter the min value for 2 items and min +1 for any one item1	1	2	1	Message should be displayed can't form a triangle			
4	Enter the min value for 2 items and min +1 for any one item1	2	1	1	Message should be displayed can't form a triangle			
5	Enter the normal value for 2 items and 1 item is min value	5	5	1	Should display the message Isosceles triangle			
6	Enter the normal value for 2 items and 1 item is min value	5	1	5	Should display the message Isosceles triangle			
7	Enter the normal value for 2 items and 1 item is min value	1	5	5	Should display the message Isosceles triangle			
8	Enter the normal Value for a, b and c	5	5	5	Should display the message Equilateral triangle			

9	Enter the normal value for 2 items and 1 item is max value	5	5	10	Should display the message Not a triangle			
10	Enter the normal value for 2 items and 1 item is max value	5	10	5	Should display the message Not a triangle			
11	Enter the normal value for 2 items and 1 item is max value	10	5	5	Should display the message Not a triangle			
12	Enter the max value for 2 items and max - 1 for any one item	10	10	9	Should display the message Isosceles triangle			
13	Enter the max value for 2 items and max - 1 for any one item	10	9	10	Should display the message Isosceles triangle			
14	Enter the max value for 2 items and max - 1 for any one item	9	10	10	Should display the message Isosceles triangle			
15	Enter the max value for a, b and c	10	10	10	Should display the message Equilateral triangle			

**5. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of dataflow testing, derive different test cases, execute these test cases and discuss the test results.**

**/Program 5: (Dataflow Testing for commission calculation)**

```
#include<stdio.h>
int main()
{
    int locks, stocks, barrels, tlocks, tstocks, tbarrels;
    float lprice,sprice,bprice,lsales,ssales,bsales,sales,comm;
    lprice=45.0;
    sprice=30.0;
    bprice=25.0;
    tlocks=0;
    tstocks=0;
    tbarrels=0;
    printf("\nenter the number of locks and to exit the loop enter -1 for
locks\n");scanf("%d", &locks);
    while(locks!=-1) {
        printf("enter the number of stocks and barrels\n");
        scanf("%d%d",&stocks,&barrels);
        tlocks=tlocks+locks;
        tstocks=tstocks+stocks;
        tbarrels=tbarrels+barrels;
        printf("\nenter the number of locks and to exit the loop enter -1 for
locks\n"); scanf("%d",&locks);
    }
    printf("\ntotal locks = %d",tlocks);
    printf("total stocks =%d\n",tstocks);
    printf("total barrels =%d\n",tbarrels);

    lsales = lprice*tlocks;
    ssales=sprice*tstocks;
    bsales=bprice*tbarrels;
    sales=lsales+ssales+bsales;
    printf("\nthe total sales=%f\n",sales);
    if(sales > 1800.0)
    {
        comm=0.10*1000.0;
        comm=comm+0.15*800;
        comm=comm+0.20*(sales-1800.0);
    }
    else if(sales > 1000)
    {
        comm =0.10*1000;
        comm=comm+0.15*(sales-1000);
    }
    else
        comm=0.10*sales;
    printf("the commission is=%f\n",comm);
    return 0;
}
```

---

**Test Case Name : Data Flow Testing for Commission Program**

**Experiment No : 4**

**Precondition : Enter -1 for locks to exit from input loop**

**Brief Description : Enter the locks, stocks and barrels > 0**

**Define /Use nodes for variables in the commission problem**

<b>Variable name</b>	<b>Defined at node</b>	<b>Used at Node</b>
--------------------------	------------------------	---------------------

### Selected Define/Use Paths for Commission problem

Test case id	Description	Variables Path (Beginning, End nodes)	Du Paths	Definition clear?	Comments
1	Check for lock price variable DEF(lprice,7) and USE(lprice,24)	(7 , 24)	<7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24>	Yes	
2	Check for Stock price variable DEF(sprice,8) and USE(sprice,25)	(8 , 25)	<8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25>	Yes	
3	Check for barrel price variable DEF(bprice,9) and USE(bprice,26)	(9 , 26)	<9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26>	Yes	
4	Check for total locks variable DEF((tlocks,10) and DEF(tlocks,16)) and 3 usage node(USE(tlocks,16),USE(tlocks,21), USE(tlocks,24))	(10 , 16)	<10-11-12-13-14-15-16>	Yes	
		(10 , 21)	<10-11-12-13-14-15-16-17-18-19-20-14-21>	No	
		(10 , 24)	<10-11-12-13-14-15-16-17-18-19-20-14-21-22-23-24>	No	
		(16 , 16)	<16-16>	Yes	
		(16 , 21)	<16-17-18-19-14-21>	No	
		(16 , 24)	<16-17-18-19-20-14-21-22-23-24>	No	
5	Check for total stocks variable DEF((tstocks,11) and DEF(tstocks,17)) and 3 usage node(USE(tstocks,17),USE(tstocks,22), USE(tstocks,25))	(11 , 17)	<11-12-13-14-15-16-17>	Yes	
		(11 , 22)	<11-12-13-14-15-16-17-18-19-20-21-14-21>	No	
		(11 , 25)	<11-12-13-14-15-16-17-18-19-20-21-14-21-23-24-25>	No	
		(17 , 17)	<17-17>	Yes	
		(17 , 22)	<17-18-19-20-14-21-22>	No	

		(17 , 25)	<17-18-19-20-14-21-22-23-24-25>	No	
6	check for locks variable ( DEF(locks,13), DEF(locks,19) and USE(locks,14),USE(locks,16)	(13 , 14)	<13-14>	Yes	Begin the loop
		( 13 , 16)	<13-14-15-16>	Yes	
		(19 , 14)	<19-20-14>	Yes	
		(19 , 16)	<19-20-14-15-16>	Yes	Repeat the loop
7	Check for stocks variable (DEF(stocks,15) and USE(stocks,17)	(15 , 17)	<15-16-17>	Yes	
8	Check for sales DEF(sales, 27) and USE(Sales, 28), USE(Sales , 29), USE(Sales,33) , USE(Sales , 34) , USE(Sales,37) , USE(Sales , 39)	(27 ,28)	<27-28>	Yes	
		(27 , 29)	<27-28-29>	Yes	
		(27 , 33)	<27-28-29-30-31-32-33>	Yes	
		(27 , 34)	<27-28-29-34>	Yes	
		(27 , 37)	<27-28-29-34-35-36-37>	Yes	
		(27 , 39)	<27-28-29-34-38-39>	Yes	
9	Check for Commission variable DEF(comm, 31,32,33) , DEF(comm,34,35) and DEF(comm,39) and USE(comm,40)	( (31,32,33),40)	<31-32-33-40>	Yes	
		((34 , 35) , 40)	<34-35-40>	Yes	
		((39 , 40 )	<39 - 40>	Yes	

## Program 6 (Binary Search - Path Testing)

**/\* Design, develop a code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases execute these test cases and discuss the test results \*/**

```
#include<stdio.h>
int binsrc(int x[],int low,int high,int key)
{
    int mid; while(low<=high)
    {
        mid=(low+high)/2; if(key==x[mid])
            return mid; if(key<x[mid])
            high=mid-1;
```

```

        else    low=mid+1;

    }

    return -1;
}

int main()
{
    int x[20],key,i,n,succ;
    printf("Enter the n value");
    scanf("%d",&n);
    if(n>0)
    {
        printf("enter the elements in ascending order\n");
        for(i=0;i<n;i++)
            scanf("%d",&x[i]);

        printf("enter the key element to be searched\n");
        scanf("%d",&key);
        succ=binsrc(x,0,n-1,key);
        if(succ>=0)
            printf("Element found in position = %d\n",succ+1);
        else
            printf("Element not found \n");
    }
    else

        printf("Number of element should be greater than zero\n");
    return 0;
}

```

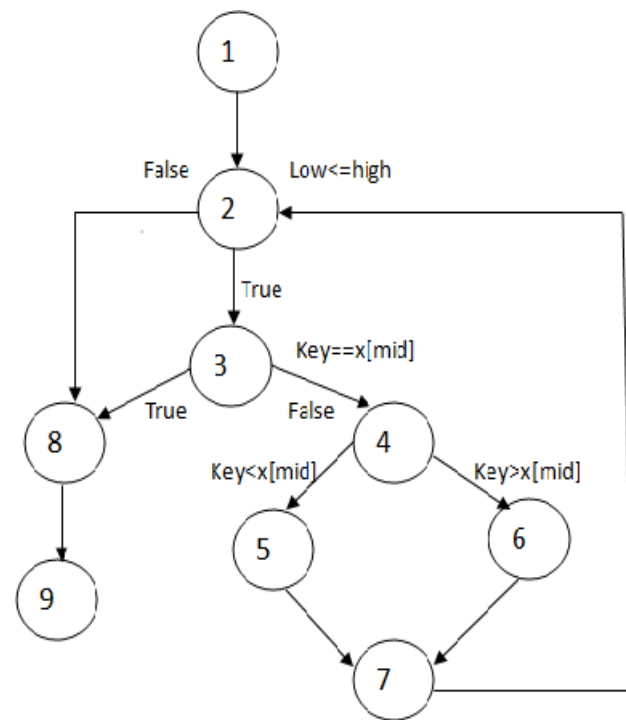


### Binary Search function with line number

```
int binsrc(int x[],int low,int high,int key)
{
    int mid;
    while(low<=high)
    {
        mid=(low+high)/2;
        if(key==x[mid])
            return mid;
        if(key<x[mid])
            high=mid-1;
        else
            low=mid+1;
    }
    return -1;
}
```

1  
2  
3  
4  
5  
6  
7  
8  
9

### Program Graph – for Binary Search



### Independent Paths:

#Edges=11, #Nodes=9, #P=1

$$V(G) = E - N + 2P = 11 - 9 + 2 = 4$$

**P1:** 1-2-3-8-9

**P2:** 1-2-3-4-5-7-2

**P3:** 1-2-3-4-6-7-2

**P4:** 1-2-8-9

**Pre-Conditions/Issues:**

Array has Elements in Ascending order	T/F
Key element is in the Array	T/F
Array has ODD number of Elements	T/F

**Test Cases – Binary Search**

Paths	Inputs		Expected Output	Remarks
	X[]	Key		
P1: 1-2-3-8-9	{10,20,30,40,50}	30	Success	Key $\in$ X[] and Key==X[mid]
P2: 1-2-3-4-5-7-2	{10,20,30,40,50}	20	Repeat and Success	Key < X[mid] Search 1 <sup>st</sup> Half
P3: 1-2-3-4-6-7-2	{10,20,30,40,50}	40	Repeat and Success	Key > X[mid] Search 2 <sup>nd</sup> Half
P4: 1-2-8-9	{10,20,30,40,50}	60 OR 05	Repeat and Failure	Key $\notin$ X[]
P4: 1-2-8-9	Empty	Any Key	Failure	Empty List

