### Week 3—Lab 1

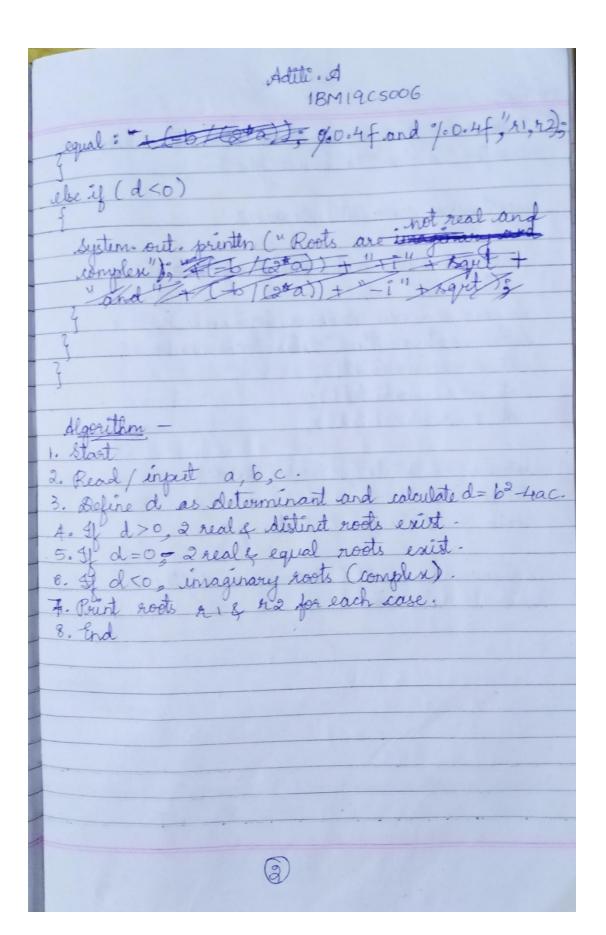
Develop a Java program that prints all real solutions to the quadratic equation  $ax^2 + bx + c = 0$ .

Read in a, b, c and use the quadratic formula. If the discriminate b^2-4ac is negative, display a message stating that there are no real solutions.

```
import java.util.Scanner;
public class Quad_eq
public static void main(String[] args)
{
Scanner sc=new Scanner(System.in);
double r1,r2;
System.out.println("Enter the value of a: ");
double a=sc.nextDouble();
System.out.println("Enter the value of b: ");
double b=sc.nextDouble();
System.out.println("Enter the value of c: ");
double c=sc.nextDouble();
double d = (b*b)-(4*a*c);
double im;
double sqrt= Math.sqrt(d);
if(d>0)
{
 r1=(-b+sqrt)/(2*a);
 r2=(-b-sqrt)/(2*a);
```

```
System.out.printf("Roots are real and distinct: %.4f and %.4f", r1,r2);
}
else if(d==0)
{
    r1=r2= (-b/(2*a));
    System.out.printf("Roots are real and equal: %.4f and %.4f", r1,r2);
}
else if(d<0){
    System.out.println("Roots are complex and not real");
}
```

Atti. A 1BM19(5006 29 9 20 Lab 1 a) write a fava program to find all roots of quad eg import java util Scarrer; public class Quad-eggs {
public class static void main (string [] args) Scanner sc = new Scanner (System in) 3 double 21, 923 System. out. println ("Enter the value of a: "); double a = sc . nest Double (): System. out. println ("Enter the value of b: ");
double b = sc. next Double (); system . out . println ("Enter the value of c: "); double C= sc. next Double (); double d = (b\*b) -(4\*a\*c). double sout = Math. sout (d); if (d≥0 91 = (-b+sqrt)/(2\*a); A 2 = (-b - sqrt)/(2+a); System. out. println ("Roots are real and distinct: 1.0.4f and Total; 9.0.4f 2 211, 92); System. out. printle ("Roots are real and



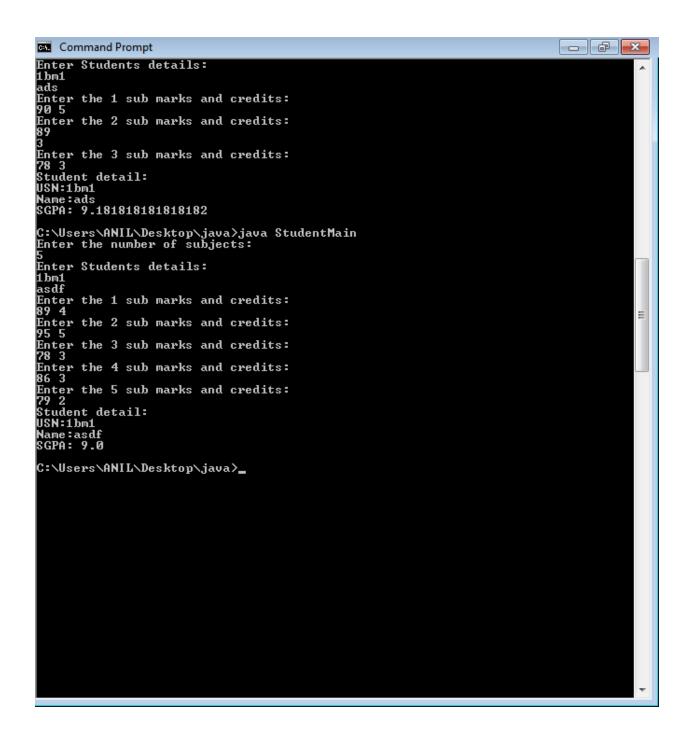
## Week 4—Lab 2

Develop a Java program to create a class Student with members usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

```
import java.util.Scanner;
class Student
{
private String usn, name;
private double sgpa;
private int n, i, sum=0, cred_sum=0,grade;
double[] marks=new double[n];
int credit[]=new int[n];
Student()
Scanner sc=new Scanner(System.in);
System.out.println("Enter the number of subjects: ");
n=sc.nextInt();
}
void getStdData(){
Scanner sc=new Scanner(System.in);
System.out.println("Enter Students details:");
```

```
usn=sc.next();
name=sc.next();
for(i=0; i<n; i++){
System.out.println("Enter the "+(i+1)+" sub marks and credits:");
marks[i] = sc.nextDouble();
credit[i]=sc.nextInt();
}
}
void sgpa_cal(){
for(i=0; i<n; i++){
if(marks[i]>=90 && marks[i]<=100)
grade=10;
else if(marks[i]>=80 && marks[i]<90)
grade= 9;
else if(marks[i]>=70 && marks[i]<80)
grade=8;
else if(marks[i]>=60 && marks[i]<70)
grade=7;
else if(marks[i]>=50 && marks[i]<60)
grade=6;
else if(marks[i]>=40 && marks[i]<50)
grade=5;
else if(marks[i]<40)
grade=0;
```

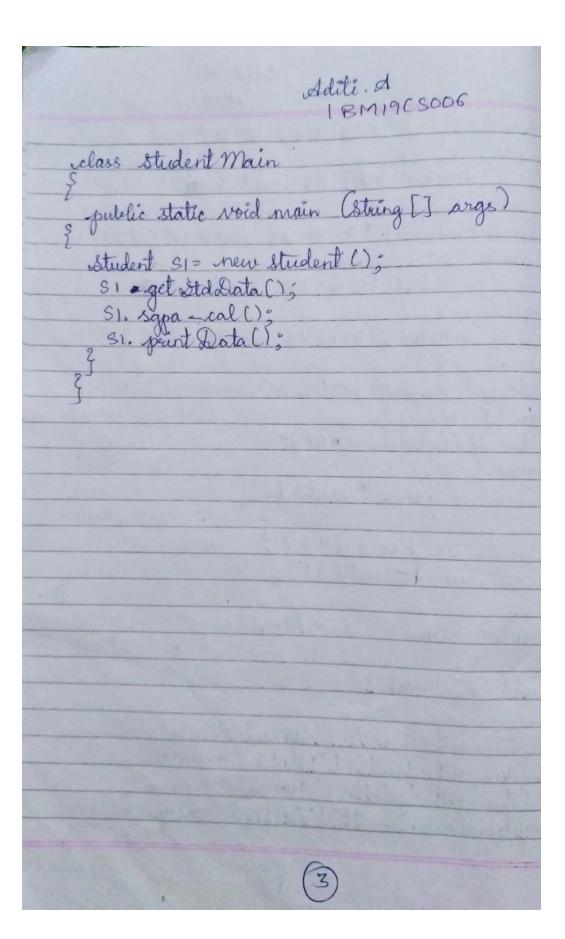
```
sum+= grade*credit[i];
}
for(i=0; i<n; i++){
cred_sum+=credit[i];
}
sgpa= (double)sum/cred_sum;
 void printData()
 {
 System.out.println("Student detail: ");
 System.out.println("USN:"+usn);
 System.out.println("Name:"+name);
 System.out.println("SGPA: "+sgpa);
 }
}
class StudentMain
{
public static void main(String[] args){
         Student s1= new Student();
         s1.getStdData();
     s1.sgpa_cal();
         s1.printData();
}
}
```



Aditi. A 1BM19CS006 6/10/20 Lab 2 import java util . Scanner oclass Student & private String usu, name; private double sapa private ent n, i, sum = 0; ered sum double mark [] = new double [] int wedet [] = new int []; Student () } Scanner toc = new Scanner Bystem in ); System. out. printle C'Enter the num of subjects & 2) = sc. nest Int (); Scanner sc= new Scanner (System in);
System. out. printtyln ("Enter student details 5"); name = sc. next 10(); for (izo, i(n; i++) g System out frintly C"-Enter "+(i+i)+" sub marks and credits "" marks [i] = sc. next Double(); credit [i] = se. next & Int (); void sapa-cal () {
for (izo; i<n; i++)

Aditi A. 1BM19C5006 il (marks [i] > = 90 ff marks <= 100) else if (marks[i]>= 70 ff marks[i](80) else if (marks[i]>=60 ef marks[i]<40) else if (marks [i]>=50 &f marks [i]<60) ograde = 6 ; else if ( marks [i]>=40 &4 marks [i] <50) grade = 5; else if (marks <040);
grade = 0; zoum + = grade \* credit [i]; for (i=0; i (n; i++) {

credisum textedit [i]; 2 sapa = (-double) sum/rered\_sum; svoid print Data () System. out. println ("Student detail: ");
System. out. println ("VSN: "+wsn);
System. out. println ("Name": "+name);
System. out. println ("56PA: "+sgpa);



### Week 5—Lab 3

Create a class Book which contains four members: name, author, price, num\_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString() method that could display the complete details of the book. Develop a Java program to create n book objects.

```
import java.util.Scanner;
class Book {
private String name;
private String author;
private double price;
private int num_pages;
Book(){
name=" ";
author="";
price= 0.0;
num_pages=0;
}
void getDetails(){
Scanner sc= new Scanner(System.in);
System.out.println("Enter title of the book: ");
```

```
name = sc.next();
System.out.println("Enter the author's name: ");
author = sc.next();
System.out.println("Enter the price: ");
price = sc.nextDouble();
System.out.println("Enter the num of pages: ");
num_pages = sc.nextInt();
}
public String toString()
return (""" +name+"" by " +author+ ", price: " +price+ ", number of pages: "+num_pages);
}
 public static void main(String ss[])
  {
  Scanner sc= new Scanner(System.in);
  int i,n;
  System.out.println("Enter the num of books: ");
  n= sc.nextInt();
  Book b[]=new Book[n];
  for(i=0; i<n; i++)
 {
  b[i]= new Book();
  System.out.println(" Book" +(i+1)+" Details: ");
```

```
b[i].getDetails();
}
for(i=0; i<n; i++){
  System.out.println(b[i]);
}
</pre>
```

```
Command Prompt
 C:\Users\ANIL\Desktop\java>java Book
Enter the num of books:
2
Enter the num of books:

2

Book1 Details:
Enter title of the book:
Cherry_Tree
Enter the author's name:
Ruskin_Bond
Enter the price:
500
Enter the num of pages:
32

Book2 Details:
Enter title of the book:
Original
Enter the author's name:
Dan_Brown
Enter the price:
304.5
Enter the num of pages:
414
'Cherry_Tree' by Ruskin_Bond, price: 500.0, number of pages: 32
'Original' by Dan_Brown, price: 304.5, number of pages: 414
C:\||sers\ANIL\|Deskton\|iaua\|
 C:\Users\ANIL\Desktop\java>_
```

Adili . A 1BM19CS006 13/10/20 Lab 3 (8) Create a class Book which contains four ments name, author, price, num pages. Include a construction to set the values for the members. Include methods to set & get details of the objects. Include a to string () method that could display the complete details of the book. import java, util Scanner; private string name;
private string author;
private double price;
private int num-pages; Book () f price - 2 0.0; num-pages = 0; word get Details () { Scanner Sc = new Scanner (System.in);
System.out. println ("Enter the title of book: ");
name = Sc. nesit();
System.out. println ("Enter the author's name: "); System. out, prently ("Enter the price: ");

Aditi. A 1BM19CS006 price = Sc. next Frouble (). Systems out printly ("Enter the num of pages: "} norm - pages = sc. next Int (). public String to String () return (" " + mame+ " by " + author + " price + price + price + price + price + pages " + num pages public static void main (String 85[]) Banner sc = mentioner ( Sustem in ); System out println ("Enter the number of books n= sc. next Int(); Book b[] = new Book[n]: stor (1=0; 1<n; 1++) b[i]= neus Book (); System. out. println ("Book "+(i+1)+ "Details b[i] get Details (); for (izo: icn; it+) } System. out. println (b[i]);

### Week 8—Lab 4

Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea() that prints the area of the given shape.

```
import java.util.Scanner;
abstract class Shape{
int a,b;
Scanner sc = new Scanner(System.in);
abstract void printArea();
}
class Rectangle extends Shape
{
void printArea()
{
System.out.print("Enter length and breadth of Rectangle: ");
a = sc.nextInt();
b = sc.nextInt();
System.out.println("The area of Rectangle is: "+a*b);
}
}
```

class Triangle extends Shape

```
{
void printArea()
{
System.out.print("Enter base and height of Triangle: ");
a = sc.nextInt();
b = sc.nextInt();
System.out.println("The area of Triangle is: "+(a*b)/2);
}
}
class Circle extends Shape
{
void printArea()
{
System.out.print("Enter radius of Circle: ");
a = sc.nextInt();
System.out.println("The area of Circle is: " +3.14f*a*a);
}
}
class ShapeMain
{
public static void main(String[] args)
{
Rectangle rec = new Rectangle();
```

```
rec.printArea();

Triangle tri = new Triangle();

tri.printArea();

Circle cir = new Circle();

cir.printArea();
}
```

```
C:\Windows\system32\cmd.exe

3

C:\Users\A\Desktop\java\javac Shape.java

C:\Users\A\Desktop\java\javac ShapeMain
Enter length and breadth of Rectangle: 4 3
The area of Rectangle is: 12
Enter base and height of Triangle: 6 5
The area of Triangle is: 15
Enter radius of Circle: 3
The area of Circle is: 28.26

C:\Users\A\Desktop\java\java ShapeMain
Enter length and breadth of Rectangle: 5
2
The area of Rectangle is: 10
Enter base and height of Triangle: 4
3
The area of Triangle is: 6
Enter radius of Circle: 7
The area of Circle is: 153.86002

C:\Users\A\Desktop\java\dir
```

1BM19CS006 P (1+R) Week 8 i) import java util Scanners. abstract class Shape & inta, b; &canner sc= new Scanner (System in); abstract void printerea ( class Reitangle extends Shape ? void printdrea () { System out printly C'Enter length and love ath of Rectancy: "); a=sc. next Int (): b=sc. next Int (); System. out. println l'Area of Rectargle is: class Triangle extends Shape { void printereal) ? System. out. println l'Enter base and height of Touaragei a = sc. next Int(): b= sc. ment Int (1; System. out. println ("Area of Triangle is: "H(a+b)/2);

## -1BM19 CS006 class lincle extends shape ? void printerea () { System.out. println ("Enter radius of lincle: "); a-sc. next ent (); System. out. println ("Area of lincle is " +3.14f \*a\*a). class ShapeMain { public static void main (string [] args) { Rectangle rec = new Rectangle (); rec. printdrea (); Iriangle tri = new Iriangle!); tri. printerea (); Linde in = new Linde (): cir. printArea ();

### Week 8 – Lab 5

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called savings account and the other current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes Curr-acct and Sav-acct to make them more specific to their requirements. Include the necessary methods in order to achieve the following tasks: • Accept deposit from customer and update the balance. • Display the balance. • Compute and deposit interest • Permit withdrawal and update the balance • Check for the minimum balance, impose penalty if necessary and update the balance.

```
import java.util.Scanner;
abstract class Account
{
String name, acctype;

long accNo;
double bal;
Account(String name, long accNo, double bal, String acctype)
{
    this.accNo = accNo;
    this.name = name;
    this.bal = bal;
```

```
this.acctype = acctype;
}
abstract void addBal(double amt);
abstract void displayBal();
abstract void withdrawBal(double amt);
class Curr_acct extends Account
{
final double minBal = 1000.0;
Curr_acct(String name, long accNo, double bal)
{
super(name, accNo, bal, "Current");
System.out.println("Name: "+name+"\n Accno: "+accNo+"\n Balance: "+bal+"\n Account Type:
"+acctype);
}
void addBal(double amt)
{
this.bal += amt;
}
void displayBal()
{
System.out.println("The balance is: "+this.bal);
}
void checkBal(){
if(this.bal<minBal)
{
```

```
System.out.println("Insufficient balance, service charge imposed");
this.bal -= this.bal*0.02;
}
}
void withdrawBal(double amt)
{
this.bal -= amt;
checkBal();
}
}
class Sav_acct extends Account
{
Sav_acct(String name, long accNo, double bal)
{
super(name, accNo, bal, "Savings");
System.out.println("Name: "+name+"\n Accno: "+accNo+"\n Balance: "+bal+"\n Account Type:
"+acctype);
}
void addBal(double amt)
{
this.bal+= amt;
}
void addCI(double amt)
{
```

```
this.bal+= amt;
addIntr();
}
void addIntr()
{
int tm=2, R=7;
this.bal+= this.bal*(Math.pow((1+(R/100)), tm));
}
void displayBal()
{
System.out.println("The balance is: "+this.bal);
}
void withdrawBal(double amt)
{
this.bal-= amt;
}
}
class AccountMain {
public static void main(String[] args) {
Scanner sc = new Scanner(System.in);
double amt;
System.out.println("Enter details:");
System.out.println("Name:");
String s1=sc.next();
```

```
System.out.println("Account Number:");
long s2=sc.nextLong();
while(true) {
System.out.println("Account type:\n 1.Current account\n 2.Savings account\n 3.Exit");
int o=sc.nextInt();
if(o==1){}
System.out.println("The Current Account provides cheque book facility but no interest.");
Curr_acct cr = new Curr_acct(s1, s2, 20000);
while(true) {
System.out.println("1.Deposit\n 2.Display Balance\n 3.Withdraw Amount\n 4.Exit");
int ch = sc.nextInt();
switch (ch) {
case 1:
System.out.println("Enter the amount to be added:");
amt = sc.nextDouble();
cr.addBal(amt);
break;
case 2:
cr.displayBal();
break;
case 3:
System.out.println("Enter the amount to be withdrawn:");
amt = sc.nextDouble();
cr.withdrawBal(amt);
break;
```

```
case 4:System.exit(0);
default:System.out.println("Invalid choice");
}
}
}
else if(o==2){
System.out.println("The Savings Account provides compound interest and withdrawal facilities but no
cheque book facility.");
Sav_acct sv = new Sav_acct(s1, s2, 5000);
while(true) {
System.out.println("1.Deposit\n 2.Deposit compound interest\n 3.Display Balance\n 4.Withdraw
Amount\n 5.Exit");
int ch = sc.nextInt();
switch (ch) {
case 1:
System.out.println("Enter the amount to be added:");
amt = sc.nextDouble();
sv.addBal(amt);
break;
case 2:
System.out.println("Enter the amount to be compunded: ");
amt=sc.nextDouble();
sv.addCl(amt);
break;
case 3:
sv.displayBal();
```

```
break;
case 4:
System.out.println("Enter the amount to be withdrawn:");
amt = sc.nextDouble();
sv.withdrawBal(amt);
break;
case 5:System.exit(0);
default:System.out.println("Invalid choice");
}
}
}
else if(o==3)
System.exit(0);
else
System.out.println("Invalid choice");
}
}
```

}

```
- - - X
C:\Windows\system32\cmd.exe - java AccountMain
Enter details:
Name:
asd
Account Number:
234556778
Account type:
 1.Current account
2.Savings account
3.Exit
The Current Account provides cheque book facility but no interest.
Name: asd
Accno: 234556778
Balance: 20000.0
Account Type: Current
1.Deposit
2.Display Balance
3.Withdraw Amount
4 Evit
  4.Exit
Enter the amount to be added:
4000
1.Deposit
2.Display Balance
3.Withdraw Amount
4.Exit
The balance is: 24000.0
1.Deposit
2.Display Balance
3.Withdraw Amount
4.Exit
                                                                                                                                                                    Ξ
Enter the amount to be withdrawn:
1000
1.Deposit
2.Display Balance
3.Withdraw Amount
4.Exit
The balance is: 23000.0
1.Deposit
2.Display Balance
3.Withdraw Amount
4.Exit
C:\Users\A\Desktop\java>java AccountMain
Enter details:
Name:
fgh
Account Number:
1678790733
Account type:
1.Gurrent account
2.Savings account
3.Exit
```

```
C:\Windows\system32\cmd.exe - java AccountMain
                                                                                                                                              - F X
1678790733
Account type:
1.Current account
2.Savings account
3.Exit
2
The Savings Account provides compound interest and withdrawal facilities but no cheque book facility.
Name: fgh
Accno: 1678790733
Balance: 5000.0
Account Type: Savings
1.Deposit
2.Deposit compound interest
3.Display Balance
4.Withdraw Amount
5.Exit
Enter the amount to be added:
4000
1.Deposit
2.Deposit compound interest
3.Display Balance
4.Withdraw Amount
5.Exit
The balance is: 9000.0
1.Deposit
2.Deposit compound interest
3.Display Balance
4.Withdraw Amount
5.Exit
Enter the amount to be compunded:
1000
1.Deposit
2.Deposit compound interest
3.Display Balance
4.Withdraw Amount
5.Exit
                                                                                                                                                                   Ξ
The balance is: 20000.0
1.Deposit
2.Deposit compound interest
3.Display Balance
4.Withdraw Amount
5.Exit
Enter the amount to be withdrawn:
2000
1.Deposit
2.Deposit compound interest
3.Display Balance
4.Withdraw Amount
  5.Exit
The balance is: 18000.0
```

1BM19CS006 3/11/20 Lab 5 import java. util . Scanner; abstract class secount String name, actype; long accNo; double bal? Account (String name, long accho, double bala String actifie ) this. accho = accho; this name = name; this leal z leal; this actype = actype; abstract void addBal (double ant); abstract void displayBal (); abstract void withdrawfal (double ant); class Curractt extends Account final double minBal = 1000.0; Super (name, accho, bal, "Luvrent");
System. out. println ("Name: "+ name + "In Accno:"
+ acc No + "In Balance: "+bal+" In Account Type: + acctype );

1BM19CS006 roid addBal (double ant) { this bal + = ant; word display Bal () System. out. println ("The balance is " + this. bal); roid checkbal () if (this bal < minBal) System. out. println ("Insufficient balance, service charge will be imposed "); this bal - = this bal \$0.000 void withdrawsal (double ant) this obal -= ant; checkBal(); class save acct extends Account far act (String name, long acino, double bal) Super (name, au No, bal, "Savings"); System. out. println ("Name: "+ mame+" \n Account Jype: "+ acc No + "\n Balance: "+bal+" \n Account Jype: + actype );

```
1BM19CS006
I void addBal (double ant)

This . I al + = ant;
void add CI (double ant)
this. bal + = ant;
 addInter ();
 word Inter GoddIntel)
 this. bal += this. bal = (Math. poro((1+(R/100)) = tm));
svoid display Bal ()
 System. out. printla ("The bolame is: "+this coal);
  void withdraw Bal (double amount)
  this bal - = ant;
  class Account Main &
  public static void main (string [] args) {
Scanner sc=new Scanner (System. in);
double amt;
 System. out. println ("Enter details: ").
System. out. println ("Name: ").
String = z sc. next (1;
```

System. out. println (" Account Number: "); long 82 = sc. nextdong(); while (true) System out printly C"Account type: Vir 1. lurrent account in 2. Lavings account in 3. Ent! "); 0=sc. nestInt(); il (0=21) { system out printly ("The current account provides cheque look facility but no interest "): Sur acct - ce = new lure acct (51,82, 20000); while (true) ? system. out. println ("1. Deposit In 2. Display balance m 3. Withdrane Amount In 4. Exit"); int ch = sc. next Int(); case 1: System out printly ("Enter the amount to be added " "); ant = sc. next Double(); ur. add Bal (ant); break case 2: cr. displayBall); ease 3: System. out. printly ("Enter amount to be withdrawn" ant = &c - next Soull (). er. withdraw Bal (ant); break : lose 4: System exit (0); default: System. out. println ("Invalid choice");

18M19CS006 else if (0==2) { System out printly ("The Savings Account provides compound enterest and withdrawal facilities but no cheque book facility " Sav act sv=new Sav act (S1, 52, 5000); while (true) } System. out. println ("1. Deposit In 2. Deposit compound interest In 3. Display Balance In 4. Withdraw Amount In 5. Exit ). int ch = sc. next Int(); case 1: System-out printles ("Enter the amount to be added?" amt = sc. next Double ); sv. add Bal (ant); break; cases: System. out. printly ("Enter the amount to be compounded & "> ant = sc. next Double (); by. add (I (ant); break? case 3° sv. displayBall); break; case 4: System-out printly ("Enter the amount to be sont = sc. next Double (); Euro withdraw Bal (ant); break; case 5: ent 102 bystem. ent (0);

# 1BM19CS006 default : System out println ("Invalid choice"); System . out - println ("Invalid choice");