B.M.S COLLEGE OF ENGINEERING BENGALURU

Autonomous Institute, Affiliated to VTU



LAB REPORT

23CS3PCOOJ

Submitted in partial fulfilment of the requirements for Lab Bachelor of Engineering

in

Computer Science and Engineering

Submitted by:

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```
Kevanth K
  Class hello World
                                              1BM22(5220
     Public static void main (String [] args)
                               ( Trees prost ) were line there will
     System. out. prentln ("hello World");
     helloWorld
Class suctangle Area E
      public static void meen (strong [] artys) {
        int length, breach;
       length = Integer. parsiInt (args [0]);
       breedth = Integer. parse Int (args [1]);
       intaria = length + brugoth;
       System. out puntle & "lugth = " + lugh );
      System. out peintly (" breadth = " + breadth);
     System. out . pruth ("Area:" + Area);
                                    more cut popular " no contract thing
                                     to a train to the captor of the and
```

```
Revauth K
                                                   1BM 22CS 220
    class Auto Array {
   public state void man (Strong args [])
  Int month-days = [31, 28, 31, 30, 4, 30, 31, 31, 30, 313;
  System. Out print la ["April has "+ month - days [3] + "days. "),
 Olr > April has 30 days.
  import your wil Scanner;
 Class scanner {
  public static void noun (Strong args CJ)
                                  would (" the " " see )
  1 ta; floats; Stays;
  Scanner in = new Scanner (System - 11);
 System. ord. polledla ("cuta a stiling:");
 S = in nead Lane();
System. Out. puliather ("you entered strang"+5);
System. Out. possed la (" endu an integer");
a = in. next Int();
System. out . prently ("you entered enterer"+a);
System. and . prith ( "enter a float");
b = in next fload ();
System out. wind bu ("you entered float"+ b);
```

```
1 Lewanth K
                                                  1BM22 CS220
  enta a strang:
     nevanth
    you entered strong reventh
    Enter an Integer
   you entered integer 3
   - enta a float
   you entered float 2.5
  import, java . util . Scanner;
 Class polendrome
5
   public static void main (string args [])
    int n, +, sum, xev = 0;
    Scenner SC = new Scanner (System . in);
   System. out. perentla ("enter a 5 diget number: ");
  n=sc-next Int();
    t=n;
    while (t>0)
    - 91en = 91en * 10 + 91em;
    6=t/10;
   4 (rev == n)
    system. Out prent les ("Palindrous");
```

Revauth 1BM22C8220 System.out. pout lu ("not palludron"); Owfut :-Cida a 5 digit number: 12321 Palindrome Cuta a 5 digit number 12345 not palladrome Quadratic -0/01 Cuta the coefficients of a, b, c Owhat 1: -5 noots are real and distinct noot 2=4.5,615528128 900tl = 4.5615528128

```
Kevcuth k
output 2 " einter the coefficients of a, b, c
                                                    (BM22CS220
   groots are real and equal
  900+ 1= 900+2=-1.0
 Output 3 :-
  enter the coefficients of, a, b, c
    OHS
  not a quadratic equation
 enta a non zero valu for a;
                            age parts may have story addition
  good an inagurary
  900t 1= -2.0 + i Na N
 nost 2= -2.0 $ : 10a N 11 months many 2 men + 32 1 months
                 (Clarken to the I shall got a To dist muchas)
1
  import. java, wil. Scanner;
 class fact {
  public static void maln (String ags [7)
  tot fac=1;
  System. out. polithe ("cuter a number:");
  Scanner SC = new Scannu (System 11);
  int n = SC. nead Int ();
  for ( Ind 1 = 1; 1 < = n; i++) {
 $ System. Out . point lu ("the factorial!"+ face);
```

```
Kevanth &
                                         1BM22CS220
  Enta a number!
 The factorial is:
      120
8
 inport jaa. wil. *;
 class digits {
     public static void main (Strong args []) {
       long number, sum;
      Scanner SC > new Scanner (System. In);
     System. out. polith ("Enter a 5-digt number!);
     number = SC. restlong ();
    for (sum =0; runber !=0; runber = runber (10) {
             Sum=sum - number -1-10;
      System.out- poutly ("Sum of dyits: "+ sun).
Owthot >
 Enta a 5-digit number:
   12 3 45
Sum of digits = 15
```

Complete

```
as import jara. util. +;
class is poline
   Static void is julie (int n)
   ind i, m=0, flog=0;
      m= n/2
       if (n=0=0 ((n ==1))
        system out point in (n + " is not a point no ");
  else
    { for (1=2; 1<=m; 1+1)
         if (n/i = =0)

System. Out. pret lu (n+" 1's not a prim number");
      of (flag = 20)
      Egsten . Oct. poutle (n+"& a poine number");
```

public static vold now (String agr (J) int is Scann 5 = new Scann (System. 11); System. Out ported by ("Suta the value of i!"); i = Sp. next Int (); is fortune (i); Enter the Value of i It is a perhin number

```
import java. utel . Scarner;
Class Subject
    int subject Marks;
     int credits;
    Sking grade;
Class Student
   Strang name;
 Strang usn;
   double SGIPA;
   Scanna s;
                         (TODIE - down to all all whom
   Subject Subject ( ];
   Student ()
   int 1;
     Subject = new Subject (9);
     for (1=0; 1<9; 1+t)
          Subject [i] = new Subject ();
       S = new Scanner (System. In);
  void get Student Details ()
     System. out printle ("enter your name: ");
     hame = S. nost live ();
     System oud . pointly ( "ends your USN:");
    USN = S. next Lhu ();
3
```

```
void get Marks ()
      int 1:
    for (120; ic8; i++)
   System. Out. polithe ("ent's the marks and credets for course "+ i+", "),
   System out printly ("marks!");
   lit marks = S. next Int();
  System. Out. probable ("credits:");
  int Gedt = 5. next Int ();
                                                                        1010
  Subject Ci]. Subject Monks: monks;
                                                                       5
 Subject (i), credit = credit;
                                                                          11
  if (marks > 1=090 4€ mark <=100)
                                                                        dow
                                                                        dou
       subject (1). grade = "0";
                                                                        doub
  estil (morth >= 80 de martes < 90)
                                                                       for (
      subject [1]. grade = "A+";
                                                                       total
                                                                       Switch
 els if (North 7=70 & marks (80)
                                                                        Case "
     Subject (i). god = "A".
 Elu: (mards 7=66 Lt morks < 70)
                                                                     Cose "A.
    subject [1] greats = 'B+")
Che il (marks 725086 marks (60)
```

```
Subject [].gradi = "B";
   else if (marks >=40 ft marks <50)
        subject (1). gad = "(";
  else of (morks > = 0 le morbs < 40)
       subject. [i]. grade = "F";
                   "gra - total gardinand ; total creeks .
Vold Compute SGRA()
5
   int i;
 double sopa;
  double total Gedits 20;
  double totalgrade point = 0;
  for (1=0; ic8; 1+1)
                             21-got Staket Stone (1)
   total oudit + = subject CiJ. credit; Och M. ho
    Switch (subject (1). grade)
      Case "O": total grad point + = 10 * subject (i). credity
             break;
    Cose "A+" : total grad polits + = 9 * subject [i]. Oredits:
            break;
    Case "A": total grade points + 3 8 " Subject (I). check to
            break;
   case "B+": total grade points + = 7" subject (i). undis;
             break;
```

```
Case 'b": totalgrade poutet = 6 x subject (1). Credits:
        break;
       Case "C": totalgrack points + = 5 "Subject (1). cred ts;
         bleak;
        cose F": fotal grade potots + = 0 * subject (i). credits.
         break;
    sgpa = total. grad points / total credits;
    System. out-forth (" the sgpa is: "+ Sgpa);
Class sgpa
3
     pullic static void man (sky ags (J)
        Student SI = New Student)
        SI-get Student Details ().
        SI got Marks (); aldered () holded a million lots
                                ( Supple (1) god)
        SI compute SGIPAC);
                             + gray Probaga
 Enter you name!
 Revarth K
 Ende your USN
 18M22 S220
```

```
Situ the marks and aedit for cours o.
  marks:
  95
  Gudot:
  4
 Ent the marks and cred to for cours 1:
  marke:
  92
  credity
   4
Each the marks and credit for course!
 marks:
  OP0
 oudity:
  BI
ente the marks and Credit for Com 3:
 marks:
        books (String norm, string gustlan, in paris, let no
 L
Ent the mark of for com 4;
                                  the culture : author is
  mak:
                                 History Reg - Henry Eggs
   191
adly
                                   () pushed of milities
cut the mot and low 5;
  - Morte: 91
     (redits = 4
```

Ent the marks and credit for cours J; Mark: 90 adit 26 | 12 | 23 Lab-3 import java. util. Samer; clan Books Strong name, String outlor) int poice; Int num Pages; Books (String name, String author, int posce, int num lages) this . name = name; this author = author; this poice = poice; this num Pages = numPages; public String to String ()

```
Strong nome, author, poic, num Pages;
      nome: "Book name: "+ this name + "In"
      author = " Author name: " + this author + " In " ;
      per a - "Pera: "+ thes. pera + "In";
     num Pages = " Number of pages:" + this. num Pages + " In" ";
     acturn norms author + peril + remlages;
public Alass Malnbook
  public static void main (strong args [])
       Scanner S: new Scanner (system. 11).
       String name;
      String author;
                                      : Hood box with word
      int porce;
     Int rumlages;
 System. out. portable ( "Enter the no of books: ");
n: S. nend Ird ();
                                    I hood by smary with ment
  Books b(];
  b = new Books [n]-
                                       I swood rolling the star
 for (1=0; 1cn; i++)
  System. Out. polith (" Detail of book"+ (1+1) + ":");
  System. Old. pout la l'esta nome of book: ");
  name = S. nesct ();
  System. out . pred in (" another norme: ").
 author = S. next();
```

```
System.out. prut ln ("pure:");
   lace = 6. next Int ();
   System. out. prut ln (" go of pages:");
    num Pages = S. rusel Int ();
    b[i] = new Books (none, author, poice, num Pages);
 System. out. prut ln ("Book Petails");
for (i=0; icn; itt)
    System. out. powth (b[i]):
                       Samuel 5 - will several Course
O whot:
                                     Stepher and from
Ends the no of books:
Ewter the details of book 1:
Enter the name of book:
horry potter
Enter the author name:
                                      b = hear books (n.)
& Knowlings
Ent the pole:
(000
Number of prages:
                       mail upo, I your pro my
800
```

Enter the detail of book 2: Enter the name of book: Revelotunory 2020 author home! Chethan Bayath price: 2000 number of pages: 15000 Book details: Book nome: horry potter Author name: o'k rowleys WG: 1000 runder of pages: 800 Bookname: Revolutionary 2020 Author name: Unthan Bagath lru: 2000 number of page = 1500

```
2ab-4
import java. will. scourse;
Class enjut Scanna
      posteled Scanna scanner;
      public injut Scanner ()
           Scanner = new Scanner (System. In);
 abstract Class shape extends Equit sconner
        double a.b;
        public shape ()
            Super ();
             System.out. pointh ("the areo of a: ");
              a = scanner . next Double ();
            System out privale (" the are of b: ");
              b= scanner next Double ();
  Class rectangle extends shape
           polle and buyle to
            vold and ()
              double area = a * b:
            system. out. puth (" the area of reatingle is: " + area);
```

```
class transferacturds shape
        pare Brooks
        us id area ()
          double area = 0.5 # 0 * b;
        System.out. pretter ("the aro of kings is: "+ cores);
class wile extends shape
       void oney ()
         double area = 3.14 *a *a;
          System. out - println (" the are of rectargle is: "+ area);
public Class manfre a
        public static word noun (Strong (Jargs)
            rectangle A = new rectangle ();
            Krangle t = nes Krugh ();
            arch c = now chele ();
            9. argae?;
              t. area (1;
             C. ana ();
```

the area of a! the area &b: the are of a! the are a of b: the area of a: the area of 6: the area of neutral is: 6.0 the area of trough is: 10.0 the and wich 15: 113.039

```
import. java. ati/. Scanna;
clan account
     Sking none; I allah court but were force) 4 ft and
     Fat acuro;
     Stony type; ( wood of "leptons", ages mad 3 hope
     double balance;
    account CString now, intaceno, Stringtype, double balance)
         this . from = naw;
         this alus = aluo;
         this . type = type;
        this . balance = balance;
     void deposit (double amout)
                                    Curried Education Worth
           balance += amout;
      Void withdraw (double comort)
          ( (Chalane - amod) >20)
               balance - = amout;
          ela
              3 yeten. out. pretly ("insufficient balan, card without a");
 void deplay()
        System out printly ("name," + name + "accus" + accus + "type" + "blame:" + kolone);
```

```
class Sow Acct extends accord
         perwade Steetic doubl pract = 5;
        Saw Acet (Strang nome, int acno, double balance)
               super (nome, acuro, "sawngs"; balance);
        void intest ()
              balance + = balance* (rat) 1100;
              System. out . porte ( balance + balance);
                                     wait of water . "
Class Current extends allowet
        point doubly metal 2500;
        bereate double service Charges 50;
        cur Acet (Strong name, int aceno, double balance)
            Super (now, aum, "curit " balane);
       void check mul)
         of (balance < min Bal)
         . System. out. pretter (" balance is less than new balance, service
                             charge import: " + series charges);
```

```
beloni à service changes;
         System. Out probable ("balan 8:" + balan);
Class accord Mary
     public static roid maker ( stong a [])
         Scanny = new Scane (System.in);
        System. out. prhole ("leute the naw:");
       String none = S. next ()
       . System. Out. perette (" ender the type (cent/somy);");
                                      Landers Sandoffer O)
       Stres type = S. neset ()
      system. out. protter ("enote the accord numbe:");
      Intalm = S. nesct Ino (1;
      System. out pruth ( veit the initial balane: ");
      double balon = S. nesot bouble (2);
      int Ch:
      desort are = hero are ( nau, ar no, type, balan);
     @ Sou Cut sa: new Sou Acet (now, auxo, balone);
      au Aut co: nas Certact (nons, auno, below)
       while (true)
         of (an type . equals ("sailings"))
             Sygn. oct . path ("In Mene In 1. deport 2. withdow
                              3. compt intest 4. dis play");
           Egstar. out pethe (" anter the choic:");
           Ch = sinext Int ();
           Switter (ch)
```

```
5
     Can 2: System. Out. Worldth ("curter the and: ");
           amond = S. nesct Jut ();
           Sa . deport (aut);
           prock;
     Case 2: System. out . prot du ("ext the aut");
           amort 2=5. neset Int (1;
            Sa. withdran (and 2))
           break;
     Care: Sa. intert ();
        : ( break; ) ( b. w. she ) short to my
                             Ofen I will have
     Cost 4: Sa. display ();
            brak; " tous it has ) day to . in
     Con S: System est (D)
     de faut : Seyden out briedle (" malil or input");
           ( freck; by on as and ) we will a sur trouse
     3 dealer and word to been now as to do and to
         what is no world ( and shop ham )?
  che
       System. out. weather ( "In Men In . deport + 2 without 3 dayly)
      System out . pretth ("ext the choic");
       Chasmod Jut ();
```

Switch (ch)

```
Con 1: System, out brild ( out the aut : ");
             amost 1= s. next Int(1;
             Ca. deport (amost 1).
                                            · tous to
             brede:
     Cost 2: Syster. Oct . pottlin Coast the and " !
            const 2 - Sineret Int ();
            Ca - withdraw (and 2), be a world on I have
           ca. Checkmin ();
                                          and the chops
           break;
     Can 3: Co. display ();
            break:
    Con 4: sypth. exit(0):
    defart : System. Out puths (8 maled injut a);
   3
-> Outlet in
   cute the nouse: see with
     Enter the account number:
          2201
      enter the intial balance:
         5000
  1. depost 2. withdraw 3. desplay
```

Cutu Choic! entravot: 600 Men 1 deput. 2 withdraw 3. desplay ends the choise desti 3 ham: Parat auno: 2201 type: curt balon 5600 survey) it is self asked

16/01/24 Lab-6 5 100 - 23000 goods 231003 first equals tellipt - Felar type 1. BMSEG type 2: BMSCE my e-275/10 innounced goods 250,000 type 2: BMSCE byhu i: MS Salaking 8 modely of types: abid " public " sie college" sie austin 22 " forespers to repp. 93544 of magres" = 55 length of SI= 5 Crapor E : concatenation of 61 and 52: BMSCGBMSEE Dalitquestion 3 : Lakel to Strong (2:10 1 P MELTER 9 Question 5 :-Hall 66000 CBR (09700). 65 66 67 88 69 70 BMSCE Helle capale Hello & True Question 4. + The gluen string is: welcome to bruse college The SAC Begin, SACEND, and dEFBegin on value as: 11, 16 and 0 The value of character any: [b, m, s, c, e,] applica

150/10/11 Question 6: Briske equals EMSEE > kme BMSCE equals college -> false Brisce equals ignorecase BMSC6-> Free Question 7: Substily & matched 31= "BMSCE college"; S2 = " welcom to BMS 66 College of engineery": of stand sz: EMSCERIUSEE author 8: tru false auxion 9 : Fabe True 3 2 5 W Quertion 10:-Hello equal Hello & True fullo == Hellowitz False, of ana Joel 18 godde made we To section suction and detection a value as: 11, 16 and o Queton 11 " The nomin in alphabetical order are: apple ball cat Von coatch

Quetion 12 5 Sorted numbers: [1,2,3,4,5,6,7,8,9,10] Question 13 : was a test theas was, too the many traper Thusas public class stands Question 19 : probled search use some stand (1) helle as orld forderlied shows name new strong (); - aution 10: Larled out saw: Connège Jubilis veld injud stidard Details () { Затичен берина = пеш берина (бурван. 111) System and puth ("Englar Us as"); USW = Samony, and (); System. Out. past ON " Enter Nours"); (C) than many 2 - way System ad , what (" Enter Samples:"); Sun = Shanna . was Int (); public void display Studied Octoble () [State " " S. 20") Study to . at 1500 ; Sylvin out fresh ("Alona:" + dana): Sylve, out jother (" Somerter " + son)

blue as alled

Country 15:

```
11 Student. Sava
  Parkage . CIE)
  Emport java util Scanner:
 Public Class Studend &
      protected strong usn = new Strong ();
      protected strong name = new strong ();
      protected int sam:
 public void input Student Details () {
        Scanner Scanner = new Scanner (System. 11);
      System.out. partile "Enter us n: ");
       USN = Scanny , next ();
       System. Out. prat QU ("Enter Name: ");
       name = Scanner. next ();
      System. aut. print ("Enter Semester:");
      Sem = Scanner. next Int ();
public Void display Studend Details () {
       System.out. bruth ("USAZ"+ USN);
     "System. out. fruth ("Name: " + name);
     System out, perinten ("Sementer;" + sem);
```

```
23/01/23
                      " Internals sava
                                                     1 () chave 333 bujul you should
                    parkoge CIE;
                    ingrat - @ java . wil. Sianna; 12 ] mano west = para ?
                   public Clas internal extends student 5
                    perotected int marks [] = new Int (6]; 1 = 301 = 001 has) ref
                   public world input CIE marks (15
                      Scanner scanner - new Scanner (System . 11);
 ble as alle
                     System out. produc "Enter the istenal means for "+ name");
                    for ( ind i = 0 ; i < 5; i++) {
                      System. out prof("Subject" + (i+1) + "marks:");
marks [i] = Scannor. next Fut();
                         CID CHAMP . REPORT & CID (2 + 5 Mars - CID) CHAMPLETD;
                                               public noid display final Makes 5
           11 Externals. java
                                                  display Stulat Mahils ();
          poukage SEE;
                                                (1+15 20) (0=141) rej
          import CIE. Intornels;
                                             System at Joseph ("Subject
        import java : will . Scomer;
        public class External external Internals {
            protected 1d matter [];
         protected int fund Marks [];
         public Educats () {
            marks = new md (5);
          final Marks = new int [5];
```

11 Main . java public world injud SEE monts () { import SEE. Bol Scanner Scanner = new Scanner (System. 10); hubbic Com Me System. out. polith ("Enter SEE Marks for" + name); public static for Cinties : 1 <5 = 1++) & tol com = [] whom for between Systam. out fruit (" Subject "+ (i+1)+" morts:"), int m . Ecto morks [i] = scanni . noxt Int (); for (In) Setul out fronting the ideal mant for " + name). & public word calculate Final Marks () & for (int 1=0; ics; it++) in nomina = lileton fund Marks [i] = morks [i] (2 + super. marks [i]; public void display final Marks () { 1 Estomato. gava display Student Websils (); System PORTAGE SEE for (inti=0; ics //++) System. ad. Joseth ("Subject" + (1+1)+": "+ fual Marks [1]): for C 3 public Clim Extende Extend Internal ! (Dakous to buster) 3 protested to find Hands []; 3 Judde Edwards Of (ld) to easy a commen (and orlands was intest?)

```
Main java
import SEE. Extends;
                                             Side USAN ibreess 201
Julus com Main ?
                                                       A : was shill
  Jubble static void note ( String cage (J) ?
                                                       المارد الموسولان : 3
       1st new of Students = 2:
       . Externols final Marks [] = new Edersolo (neng Stidects);
   for (Inti=0; 1 c nun of students; i++) {
                                                           THE 162
        funal Marks[1] = new Externels ();
        funal Montes Ei). injust Student Detall (1)
       System. out. pretty ("Ent CIE norks");
       fral Morts Ei) . infent CEE mortes ();
       System. Out. Juruth (" Esta SEE morter"):
       fund Marks [i]. injust SEE mouts (1;
                                                      show 322 if it is
   3
                                                 the open 335 of april
System out, poster (" Displayy duto: \n");
                                                          18:11
for ( Nd i = 0; ic no of studies; 171);
                                                            1. 59.
        final Marks (i). Colubbifinal Marks ();
                                                            543.87
       fund Marks (13. dis play fund Marks ();
                                                        28 20 : 0 TO
 3
                                                        A war war a B.
                                                  o : Dienella 1 5
                                                   2 de Cita com do
                                          grap shar, Landt. N.S.
```

Owtfut! . Kelmali Enta USN: 1BM22CS 201 Estavam: A (C) and pulce) when blow other one ()) Enta Senstr: 2 12 run of Students - 2. Entre CZ 6 mass. External final Marker [] + new Scherala Clem Ent Intend mark for A (g) (b) = 0; 1 c num of students; +++) } Sub 1: 45 fund Morke(1) = new Entermail ()? Sul 2: 40 Land , Yorks ET, 1964 Studget Debild (); Seb 3: 42 System and prote ("Est CIF under"); Sub 4:43 (Ordren 3E) Epsi. (Bother land Saster Oct. Lander (" CHA SEE made ") Sub5 : 49 (1) which 332 tapes - [1] while (1) Rut for SESE months Star & SEE marks for A Sylver od, forthe (" Display dut 15) Sub 1: 85 for (14 i = 0) ic No- of Ethology; 177); Sul 2: 89 food Marko []. Coledad had Marks (); Sub 3: 87 fundation (1) dayling find olars (); Sul 4 = 888 Sub 5:87 EN USN: 1BM2768220 But None = B/ Situ Seinter: 2 gut CIE mands Enh Internal Monts for B

Sub 1 = 45 Sub 2: 47 5: A. 32 Sub 3: 40 Sub 1:10 Sulo 4:43 36- 11/12 Sub 5: 744 5068378 Extr SEC monts 38:443 Enta Seemorks for B Sub 4: 90 Sub 2 = 78 SW03: 79 Sub 4:89 Sub 5:80 10 Asplaying clato! USN: 1BM22CS 201 pone: A p. Sanutu:2 Sub 1=87 Sub 2:90 Sub 3:85 Sub 4: 87

Sab. 5 287

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30/01/24 import java will. Scanner; class Wrong Age extends Exception hubbic Wrong Age (Strong message) Sun excland Fadlum coghinos to bound Super (message); Jubili Son () Homer Whong Age Class Enjust Scanner System od jedden (soto Soin das:) Son Age = S. Watted (); protected Scanner S; (Son Pac > John Age) public Input Scanner () 5 - new Scanner (System.in); france and and elic il (sortge co) class father extends Input Scanner protected int father Age ! had son") son grante over word 1 4110 public Father () throws Wrongetge 1 1/38 system and porteton ("Ender Father's Age: "Links brow side (A)32 fother Age = S. next Int (): Sur of if (father Age <0) ino?") intubed to make throw new Wrong Age ("Age cannot be negative: "));

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   hubble Son () throw Wrong Age
     super (1)
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                                        Julie Tryant Scower ()
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                                  father b age ");
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    System.out. prentlin ("son's Age:"+ son Age);
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   Lab - 9 5-
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Clars CS6Theard extends Thread &
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                   & Catch (Interrupted Exception e) {
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             wall ();
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  notify ();
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          System out . I study (" Pres Conduct - I to May ");
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deadlock:
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             Therad . Sleep (1000);
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            6. (ast ();
       void last()
           System. Out. printly (" Inside A. last");
Clay B
  Syntheorized void bar (A a)
       Strong name : Threed. Current Thread [) get Name ();
        System. out. prith Cname + " entered B. bas o);
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Thread. sleep (1000);
         Catch (Exception e)
             System. Out. freshell ("B Interrupted");
        . Catch (Facution e)
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              a.last();
  void last ()
           System. out. pruth ("Inside A. last");
                          Tured trying to fall 8. Lost ()
Class Deadlock inplanents Runnakl
      Aa = new A();
      Bb = new b();
     Deadlock ()
        Thread. Court thorad (). Set Name ("Mahr Thread");
    Thread t = new Throad ( this, " Kacky Thread");
    t-Start ();
   a. foo(b);
   System. out. pretter (" Back in man there od");
 y
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public void sum () Thursd . Alley (week) b. bar (a); System. out fruth ("Back in other thread"); Jublic state void really (Street ags []) new Deadlock; (Suddon (Caldion C) System out founds (traver - + trying to add to lost (1) & (1) tapl. D Output := () Tool blov Malu Thread entered A foo Racing Thread entered B. bar and I have been a server as the server as t Rawy Thread Kying to Call B. Lest () Inside A. last class Dearlook inflorests himm Bouk in man thread park in other flowered A a = new A(); (C)9 cont = 99 Charles () Traged. Front Horal () Set Home (" Make Thank") (whole I will march (the " Harrie Bright). in not public (" lad house loved

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Englord java aut. ";
import java aut event. ";
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remon whener (calculate Listener); ofum. Set Ursible (tww); public static word male (String args []) { Swing William Muske Later (new Rummatle () } public word secures & new User Interface (1); 3); Enter the decider and dividend: 7 Calculate A=7 B=4 Am=1

```
IAB-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;
class Ouadratic
    int a, b, c;
    double r1, r2, d;
    void getd()
        Scanner s = new Scanner(System.in);
        System.out.println("Enter the coefficients of a,b,c");
        a = s.nextInt();
        b = s.nextInt();
        c = s.nextInt();
    void compute()
    while(a==0)
            System.out.println("Not a quadratic equation");
            System.out.println("Enter a non zero value for a:");
            Scanner s = new Scanner(System.in);
            a = s.nextInt();
        d = b*b-4*a*c;
        if(d==0)
            r1 = (-b)/(2*a);
            System.out.println("Roots are real and equal");
            System.out.println("Root1 = Root2 = " + r1);
        else if(d>0)
            r1 = ((-b) + (Math.sqrt(d)))/(double)(2*a);
            r2 = ((-b)-(Math.sqrt(d)))/(double)(2*a);
            System.out.println("Roots are real and distinct");
            System.out.println("Roo1 = " + r1 + " Root2 = " + r2);
        else if(d<0)
            System.out.println("Roots are imaginary");
            r1 = (-b)/(2*a);
```

```
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 Subject
    int subjectMarks;
   int credits;
    String grade;
class Student
    String name;
    String usn;
    double SGPA;
    Scanner s;
    Subject subject[];
    Student()
    {
        int i;
        subject = new Subject[9];
        for(i=0;i<9;i++)
            subject[i] = new Subject();
        s = new Scanner(System.in);
```

```
void getStudentDetails()
        System.out.println("enter your name : ");
        name = s.nextLine();
        System.out.println("enter your usn : ");
        usn = s.nextLine();
    void getMarks()
        int i;
        for(i=0;i<8;i++)
            System.out.println("enter the marks and credits for
course " + (i+1) + ":");
            System.out.println("marks : ");
            int marks = s.nextInt();
            System.out.println("credits : ");
            int credit = s.nextInt();
            subject[i].subjectMarks = marks;
            subject[i].credits = credit;
            if(marks >= 90 && marks<=100)
                subject[i].grade = "0";
            else if(marks>=80 && marks<90)
                subject[i].grade = "A+";
            else if(marks>=70 && marks<80)
                subject[i].grade = "A";
            else if(marks>=60 && marks<70)
                subject[i].grade = "B+";
            else if(marks>=50 && marks<60)
                subject[i].grade = "B";
            else if(marks>=40 && marks<50)
                subject[i].grade = "C";
            else if(marks>=0 && marks<40)</pre>
```

```
subject[i].grade = "F";
    void computeSGPA()
        int i;
        double sgpa;
        double totalcredits = 0;
        double totalgradepoints = 0;
        for(i=0;i<8;i++)
            totalcredits += subject[i].credits;
            switch(subject[i].grade)
                case "0" : totalgradepoints +=
10*subject[i].credits;
                break;
                case "A+" : totalgradepoints +=
9*subject[i].credits;
                break;
                case "A" : totalgradepoints += 8*subject[i].credits;
                break;
                case "B+" : totalgradepoints +=
7*subject[i].credits;
                case "B" : totalgradepoints += 6*subject[i].credits;
                break;
                case "C" : totalgradepoints += 5*subject[i].credits;
                break;
                case "F" : totalgradepoints += 0*subject[i].credits;
                break;
            }
        sgpa = totalgradepoints/totalcredits;
        System.out.println("the sgpa is : "+sgpa);
class sgpa
    public static void main(String args[])
        Student s1 = new Student();
        s1.getStudentDetails();
        s1.getMarks();
        s1.computeSGPA();
```

```
}
}
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 Books
    String name;
    String author;
    int price;
    int numPages;
    Books(String name, String author, int price, int numPages)
        this.name=name;
        this.author=author;
        this.price=price;
        this.numPages=numPages;
    public String toString()
        String name,author,price,numPages;
        name="Book name:" +this.name+ "\n";
        author="Author name:" +this.author+ "\n";
        price="Price:" +this.price+ "\n";
        numPages="Number of pages:" +this.numPages+ "\n";
        return name+author+price+numPages;
public class Mainbook
    public static void main(String args[])
        Scanner s=new Scanner(System.in);
        int n;
        int i:
```

```
String name;
       String author;
       int price;
       int numPages;
       System.out.println("Enter the number of books:");
       n=s.nextInt();
       Books b[];
       b=new Books[n];
       for(i=0;i<n;i++)
           System.out.println("Enter the details of book" + (i+1) +
":");
           System.out.println("Enter the name of the book:");
           name=s.next();
           System.out.println("Enter the author name:");
           author=s.next();
           System.out.println("Enter the price:");
           price=s.nextInt();
           System.out.println("Enter the number of pages:");
           numPages=s.nextInt();
           b[i]=new Books(name,author,price,numPages);
       System.out.println("Book Details:");
       for(i=0;i<n;i++)
           System.out.println(b[i]);
```

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;
class inputScanner
```

```
protected Scanner scanner;
    public inputScanner()
        scanner = new Scanner(System.in);
abstract class shape extends inputScanner
    double a, b;
   public shape()
        super();
        System.out.println("the area of a : ");
        a = scanner.nextDouble();
        System.out.println("the area of b : ");
        b = scanner.nextDouble();
class rectangle extends shape
    public rectangle()
            super();
   void area()
   double area = a*b;
    System.out.println("the area of rectangle is : " + area);
class triangle extends shape
    public triangle()
            super();
    void area()
    double area = 0.5*a*b;
    System.out.println("the area of triangle is : " + area);
```

```
class circle extends shape
   public circle()
            super();
    void area()
    double area = 3.14*a*a;
    System.out.println("the area of rectangle is : " + area);
public class mainArea
    public static void main(String[] args)
        rectangle r = new rectangle();
        triangle t = new triangle();
        circle c = new circle();
        r.area();
        t.area();
        c.area();
```

```
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 Cur-acct and Sav-acct to make them more
specific to their
requirements. Include the necessary methods in order to achieve the
following tasks:
a)
Accept deposit from customer and update the balance.
b)
Display the balance.
c)
Compute and deposit interest
d)
Permit withdrawal and update the balance
Check for the minimum balance, impose penalty if necessary and
update the balance.
import java.util.Scanner;
class account
    String name;
    int accno;
    String type;
    double balance;
    account(String name,int accno,String type,double balance)
        this.name=name;
        this.accno=accno;
        this.type=type;
        this.balance=balance;
    void deposit(double amount)
        balance+=amount;
    void withdraw(double amount)
        if((balance-amount)>=0)
            balance-=amount;
        else
```

```
System.out.println("insufficient balance,cant
withdraw");
    void display()
        System.out.println("name:"+name+"accno:"+accno+"type:"+type+
"balance:"+balance);
class savAcct extends account
    private static double rate=5;
    savAcct(String name,int accno,double balance)
        super(name,accno,"savings",balance);
    void interest()
        balance+=balance*(rate)/100;
        System.out.println("balance:"+balance);
class curAcct extends account
    private double minBal=500;
    private double serviceCharges=50;
    curAcct(String name,int accno,double balance)
    {
        super(name,accno,"current",balance);
    }
    void checkmin()
    {
        if(balance<minBal)</pre>
```

```
System.out.println("balance is less than min
balance,service charges imposed:"+serviceCharges);
            balance-=serviceCharges;
            System.out.println("balance is:"+balance);
class accountMain
    public static void main(String a[])
        Scanner s=new Scanner(System.in);
        System.out.println("enter the name :");
        String name=s.next();
        System.out.println("enter the type(current/savings):");
        String type=s.next();
        System.out.println("enter the account number:");
        int accno=s.nextInt();
        System.out.println("enter the intial balance:");
        double balance=s.nextDouble();
        int ch;
        double amount1,amount2;
        account acc=new account(name,accno,type,balance);
        savAcct sa=new savAcct(name,accno,balance);
        curAcct ca=new curAcct(name,accno,balance);
        while(true)
            if(acc.type.equals("savings"))
                System.out.println("\nMenu\n1.deposit 2.withdraw
3.compute interest 4.display");
                System.out.println("enter the choice:");
                ch=s.nextInt();
                switch(ch)
                    case 1:System.out.println("enter the amount:");
                        amount1=s.nextInt();
                        sa.deposit(amount1);
                        break;
                    case 2:System.out.println("enter the amount:");
                        amount2=s.nextInt();
                        sa.withdraw(amount2);
                        break;
                    case 3:sa.interest();
                        break;
                    case 4:sa.display();
```

```
break;
                    case 5:System.exit(0);
                    default:System.out.println("invalid input");
                        break;
                }
            else
                System.out.println("\nMenu\n1.deposit
2.withdraw 3.display");
                System.out.println("enter the choice:");
                ch=s.nextInt();
                switch(ch)
                    case 1:System.out.println("enter the amount:");
                        amount1=s.nextInt();
                        ca.deposit(amount1);
                        break;
                    case 2:System.out.println("enter the amount:");
                        amount2=s.nextInt();
                        ca.withdraw(amount2);
                        ca.checkmin();
                        break;
                    case 3:ca.display();
                        break;
                    case 4:System.exit(0);
                    default:System.out.println("invalid input");
                        break:
```

```
Lab 6
Create a package CIE which has two classes- Student and Internals.
The class
Student has members like usn, name, sem. The class Internals derived from
Student has an array that stores the internal marks scored in five courses of the current semester of the student. Create another package SEE which has the class
External which is a derived class of Student. This class has an array that stores the
SEE marks scored in five courses of the current semester of the student. Import
```

```
the two packages in a file that declares the final marks of n
students in all five
courses.
// Internals.java
package CIE;
import java.util.Scanner;
public class Internals extends Student {
    protected int marks[] = new int[5];
    public void inputCIEmarks() {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter Internal Marks for " + name);
        for (int i = 0; i < 5; i++) {
            System.out.print("Subject " + (i + 1) + " marks: ");
            marks[i] = scanner.nextInt();
// Student.java
package CIE;
import java.util.Scanner;
public class Student {
    protected String usn = new String();
    protected String name = new String();
    protected int sem;
    public void inputStudentDetails() {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter USN: ");
        usn = scanner.next();
        System.out.print("Enter Name: ");
        name = scanner.next();
        System.out.print("Enter Semester: ");
        sem = scanner.nextInt();
    public void displayStudentDetails() {
        System.out.println("USN: " + usn);
        System.out.println("Name: " + name);
        System.out.println("Semester: " + sem);
```

```
// Externals.java
package SEE;
import CIE.Internals;
import java.util.Scanner;
public class Externals extends Internals {
    protected int marks[];
    protected int finalMarks[];
    public Externals() {
        marks = new int[5];
        finalMarks = new int[5];
    public void inputSEEmarks() {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter SEE Marks for " + name);
        for (int i = 0; i < 5; i++) {
            System.out.print("Subject " + (i + 1) + " marks: ");
            marks[i] = scanner.nextInt();
    public void calculateFinalMarks() {
        for (int i = 0; i < 5; i++)
            finalMarks[i] = marks[i] / 2 + super.marks[i];
    public void displayFinalMarks() {
        displayStudentDetails();
        for (int i = 0; i < 5; i++)
            System.out.println("Subject " + (i + 1) + ": " +
finalMarks[i]);
// Main.java
import SEE.Externals;
public class Main {
    public static void main(String args[]) {
        int numOfStudents = 2;
        Externals finalMarks[] = new Externals[numOfStudents];
```

```
for (int i = 0; i < numOfStudents; i++) {
    finalMarks[i] = new Externals();
    finalMarks[i].inputStudentDetails();
    System.out.println("Enter CIE marks");
    finalMarks[i].inputCIEmarks();
    System.out.println("Enter SEE marks");
    finalMarks[i].inputSEEmarks();
}

System.out.println("Displaying data:\n");

for (int i = 0; i < numOfStudents; i++) {
    finalMarks[i].calculateFinalMarks();
    finalMarks[i].displayFinalMarks();
}

}

}</pre>
```

```
IAB 7
Write a program that demonstrates handling of exceptions in inheritance tree.
Create a base class called
"Father" and derived class called "Son" which extends the base class. In
Father class, implement a
constructor which takes the age and throws the exception WrongAge( ) when the
input age<0. In Son class,
implement a constructor that cases both father and son's age and throws an
exception if son's age is
>=father's age.
import java.util.Scanner;
class WrongAge extends Exception
 public WrongAge(String message)
 super(message);
class InputScanner
 protected Scanner s;
 public InputScanner()
  s = new Scanner(System.in);
```

```
class Father extends InputScanner
protected int fatherAge;
public Father() throws WrongAge
 System.out.println("Enter Father's Age:");
 fatherAge=s.nextInt();
 if(fatherAge<0)</pre>
  throw new WrongAge("Age cannot be negetive:");
public void display()
 System.out.println("Father's Age:" + fatherAge);
class Son extends Father
private int sonAge;
public Son() throws WrongAge
 super();
 System.out.println("Enter Son's age:");
 sonAge=s.nextInt();
 if(sonAge>fatherAge)
  throw new WrongAge("Son's age cannot be greater than father's age");
 else if (sonAge<0)
  throw new WrongAge("Age cannot be negative");
public void display()
 super.display();
 System.out.println("Son's Age: " + sonAge);
```

```
public class FatherSonAge
{
  public static void main(String args[])
  {
    try
    {
       Son son=new Son();
       son.display();
    }
    catch (WrongAge e)
    {
       System.out.println("Error: " + e.getMessage());
    }
}
```

```
LAB 8
Write a program which creates two threads, one thread displaying "BMS College
of Engineering" once every ten seconds and another displaying "CSE" once
every two seconds.
class BMSThread extends Thread {
    @Override
    public void run() {
                                 while(true) {
            System.out.println("BMS college of engineering");
            try {
                Thread.sleep(10000);
            } catch (InterruptedException e) {
                e.printStackTrace();
class CSEThread extends Thread {
    @Override
    public void run() {
        while(true) {
            System.out.println("CSE");
```

```
LAB 9
Write a program that creates a user interface to perform integer divisions.
The user enters two numbers in the text fields, Num1 and Num2. The division of
Num1 and Num2 is displayed in the Result field when the Divide button is
clicked.
If Num1 or Num2 were not an integer, the program would throw a
NumberFormatException. If Num2 were Zero, the program would throw an
Arithmetic Exception Display the exception in a message dialog box.
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
class UserInterface {
    UserInterface() {
        JFrame jfrm = new JFrame("Divider App");
        jfrm.setSize(275, 150);
        jfrm.setLayout(new FlowLayout());
        // to terminate on close
        jfrm.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        JLabel jlab = new JLabel("Enter the divider and dividend:");
        // add text field for both numbers
        JTextField ajtf = new JTextField(8);
        JTextField bjtf = new JTextField(8);
        // calc button
```

```
JButton button = new JButton("Calculate");
JLabel err = new JLabel();
JLabel alab = new JLabel();
JLabel blab = new JLabel();
JLabel anslab = new JLabel();
// add in order :)
jfrm.add(err); // to display error message
jfrm.add(jlab);
jfrm.add(ajtf);
jfrm.add(bjtf);
jfrm.add(button);
jfrm.add(alab);
jfrm.add(blab);
jfrm.add(anslab);
ActionListener calculateListener = new ActionListener() {
    public void actionPerformed(ActionEvent evt) {
        try {
            int a = Integer.parseInt(ajtf.getText());
            int b = Integer.parseInt(bjtf.getText());
            if (b == 0) {
                throw new ArithmeticException();
            int ans = a / b;
            alab.setText("\nA = " + a);
            blab.setText("\nB = " + b);
            anslab.setText("\nAns = " + ans);
            err.setText(""); // Clear any previous error message
        } catch (NumberFormatException e) {
            displayErrorMessage("Enter Only Integers!");
        } catch (ArithmeticException e) {
            displayErrorMessage("B should be non-zero!");
    private void displayErrorMessage(String message) {
        alab.setText("");
        blab.setText("");
        anslab.setText("");
        err.setText(message);
};
button.addActionListener(calculateListener);
```

```
// display frame
    jfrm.setVisible(true);
}

public static void main(String args[]) {
    // create frame on event dispatching thread
    SwingUtilities.invokeLater(new Runnable() {
        public void run() {
            new UserInterface();
        }
    });
}
```

```
LAB 10
Demonstrate Inter process Communication and deadlock
class Q
    int n;
    boolean valueSet = false;
    synchronized int get() {
        while(!valueSet)
        System.out.println("\nConsumer waiting\n");
        wait();
        } catch(InterruptedException e) {
            System.out.println("InterruptedException caught");
        System.out.println("Got: " + n);
        valueSet = false;
        System.out.println("\nIntimate Producer\n"); notify();
        return n; }
    synchronized void put(int n) {
    while(valueSet)
    try {
    System.out.println("\nProducer waiting\n");
    } catch(InterruptedException e) {
        System.out.println("InterruptedException caught");
    this.n = n;
    valueSet = true;
    System.out.println("Put: " + n);
   System.out.println("\nIntimate Consumer\n");
```

```
notify();
class Producer implements Runnable {
   Q q;
   Producer(Q q) {
   this.q = q;
   new Thread(this, "Producer").start();
   public void run() {
   int i = 0;
   while(i<5) {
   q.put(i++);
class Consumer implements Runnable {
   Q q;
   Consumer(Q q) {
   this.q = q;
   new Thread(this, "Consumer").start();
   public void run() {
   int i=0;
   while(i<5) {
   int r=q.get();
   System.out.println("consumed:"+r);
    i++;
class PCFixed {
   public static void main(String args[]) {
   Q q = new Q();
   new Producer(q);
   new Consumer(q);
   System.out.println("Press Control-C to stop.");
```

```
DEADLOCK
class A
    synchronized void foo(B b)
        String name =Thread.currentThread().getName();
        System.out.println(name + " entered A.foo");
        try
            Thread.sleep(1000);
        catch(Exception e)
            System.out.println("A Interrupted");
        System.out.println(name + " trying to call B.last()");
        b.last();
    void last()
        System.out.println("Inside A.last");
    synchronized void bar(A a)
        String name =Thread.currentThread().getName();
        System.out.println(name + " entered B.bar");
        try
            Thread.sleep(1000);
        catch(Exception e)
            System.out.println("B Interrupted");
        System.out.println(name + " trying to call A.last()");
        a.last();
```

```
void last()
        System.out.println("Inside A.last");
class Deadlock implements Runnable
   A a = new A();
   B b = new B();
   Deadlock()
       Thread.currentThread().setName("MainThread");
       Thread t = new Thread(this, "RacingThread");
        t.start();
        a.foo(b); // get lock on a in this thread.
       System.out.println("Back in main thread");
   public void run()
        b.bar(a); // get lock on b in other thread.
       System.out.println("Back in other thread");
   public static void main(String args[])
        new Deadlock();
```