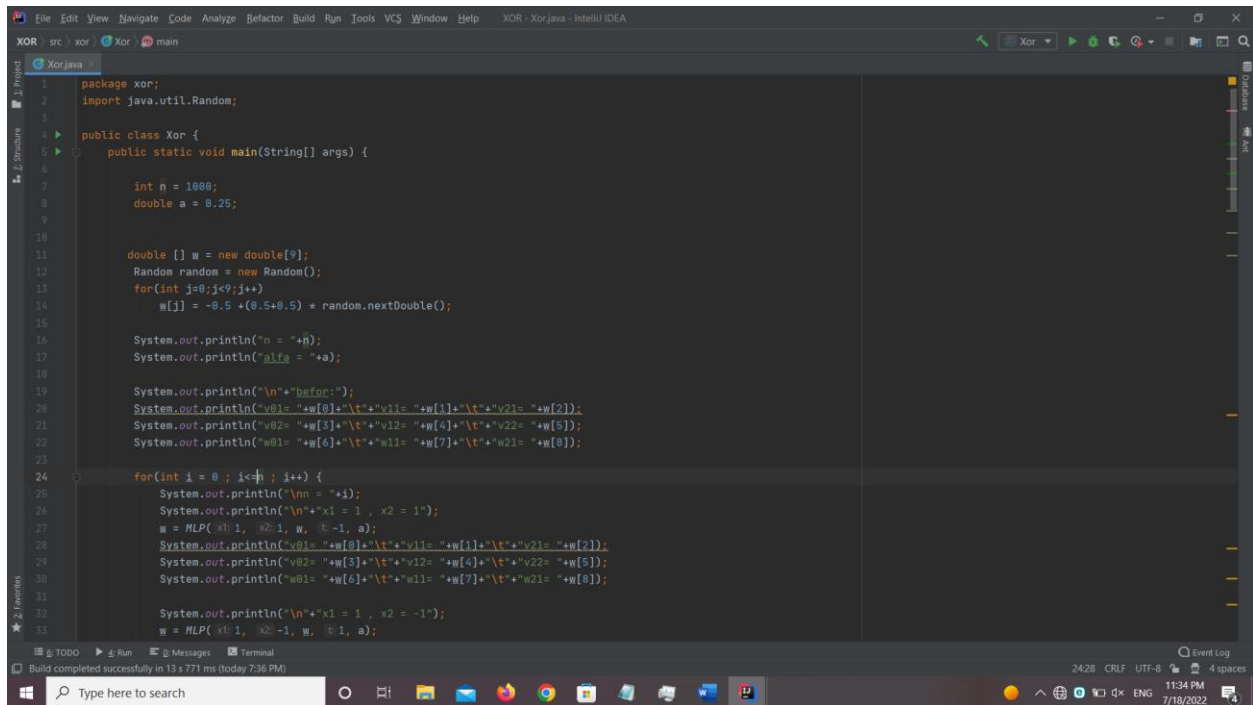


Xor:

یک بخش از کد عملیات feed forward را انجام می دهد. بخش دیگر عملیات erro backward و بخش پایانی هم عملیات به روزرسانی وزن ها.

کد:



```

package xor;
import java.util.Random;

public class Xor {
    public static void main(String[] args) {
        int n = 1000;
        double a = 0.25;

        double [] w = new double[9];
        Random random = new Random();
        for(int j=0;j<9;j++)
            w[j] = -0.5 + (0.5+0.5) * random.nextDouble();

        System.out.println("n = " + n);
        System.out.println("alfa = " + a);

        System.out.println("\n" + "before:");
        System.out.println("w01= " + w[0] + "\t" + "w11= " + w[1] + "\t" + "w21= " + w[2]);
        System.out.println("w02= " + w[3] + "\t" + "w12= " + w[4] + "\t" + "w22= " + w[5]);
        System.out.println("w01= " + w[6] + "\t" + "w11= " + w[7] + "\t" + "w21= " + w[8]);

        for(int i = 0 ; i<n ; i++) {
            System.out.println("\nn = " + i);
            System.out.println("\n" + "x1 = 1 , x2 = 1");
            w = MLP( x1:1 , x2:1, w, b:-1, a);
            System.out.println("w01= " + w[0] + "\t" + "w11= " + w[1] + "\t" + "w21= " + w[2]);
            System.out.println("w02= " + w[3] + "\t" + "w12= " + w[4] + "\t" + "w22= " + w[5]);
            System.out.println("w01= " + w[6] + "\t" + "w11= " + w[7] + "\t" + "w21= " + w[8]);

            System.out.println("\n" + "x1 = 1 , x2 = -1");
            w = MLP( x1:1 , x2:-1, w, b:1, a);
        }
    }
}

```

```
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help XOR - Xor.java - IntelliJ IDEA
XOR src \ xor \ Xor main
Xor.java
33 w = MLP(x1, x2, -1, w, t, a);
34 System.out.println("v01= "+w[0]+\t+"v11= "+w[1]+\t+"v21= "+w[2]);
35 System.out.println("v02= "+w[3]+\t+"v12= "+w[4]+\t+"v22= "+w[5]);
36 System.out.println("w01= "+w[6]+\t+"w11= "+w[7]+\t+"w21= "+w[8]);
37
38 System.out.println("\n"+"x1 = -1 , x2 = 1");
39 w = MLP(x1, x2, 1, w, t, a);
40 System.out.println("v01= "+w[0]+\t+"v11= "+w[1]+\t+"v21= "+w[2]);
41 System.out.println("v02= "+w[3]+\t+"v12= "+w[4]+\t+"v22= "+w[5]);
42 System.out.println("w01= "+w[6]+\t+"w11= "+w[7]+\t+"w21= "+w[8]);
43
44 System.out.println("\n"+"x1 = -1 , x2 = -1");
45 w = MLP(x1, x2, -1, w, t, a);
46 System.out.println("v01= "+w[0]+\t+"v11= "+w[1]+\t+"v21= "+w[2]);
47 System.out.println("v02= "+w[3]+\t+"v12= "+w[4]+\t+"v22= "+w[5]);
48 System.out.println("w01= "+w[6]+\t+"w11= "+w[7]+\t+"w21= "+w[8]);
49
50
51
52 }
53 public static double[] MLP(double x1, double x2, double w[], int t, double a){
54 // w = double v01, double v11, double v21,
55 // double v02, double v12, double v22,
56 // double w01, double w11, double w21
57 double z1 = feed(x1, x2, w[0], w[1], w[2]);
58 double z2 = feed(x1, x2, w[3], w[4], w[5]);
59 double y1 = feed(z1, z2, w[6], w[7], w[8]);
60 System.out.println("y = "+y1);
61
62 double e1 = error(t, y1);
63 double e2 = error(t, e1, w[7], z1);
64 double e3 = error(t, e1, w[8], z2);
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66 }
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XOR - Xor.java - IntelliJ IDEA
XOR src \ xor \ Xor
Xor.java
70 weight[7] = weight(a,e1,z1) + we[7];
71 weight[8] = weight(a,e1,z2) + we[8];
72
73 // z1
74 weight[0]=weight(a,e21, z1) + we[0];
75 weight[1] = weight(a,e21,z1) + we[1];
76 weight[2] = weight(a,e21,z2) + we[2];
77
78 // z2
79 weight[3] = weight(a,e22, z1) + we[3];
80 weight[4] = weight(a,e22,z1) + we[4];
81 weight[5] = weight(a,e22,z2) + we[5];
82
83 return weight;
84 }
85
86 public static double feed(double x1 , double x2 ,double w0 , double w1 , double w2){
87     double y_in = w0 + x1*w1 + x2*w2;
88     double y = (1- Math.exp(-y_in))/(1+ Math.exp(-y_in));
89     // double y = 1/(1+ Math.exp(-y_in));
90     return y;
91 }
92
93 public static double error(double t , double y){
94     double e1 = t*0.5*(1+y)*(1-y);
95     // double e1 = t*0.5*y*(1-y);
96     return e1;
97 }
98
99 public static double weight(double a , double e , double z){
100     double dw = a*e*z;
101     return dw;
102 }
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خروجی:

```
int n = 1000;
double a = 0.05;

XOR - Xor.java - IntelliJ IDEA
XOR src \ xor \ Xor \ main
Xor.java
Run:
v01= 0.3738152117957595 v11= 0.022917476168840857 v21= -0.3361482752126413
v02= -0.32897804458529803 v12= 0.46785834769995757 v22= -0.86519458859389663
w01= 0.03030200024815215 w11= -0.07119578029968694 w21= 0.12316148756826916

n = 1000

x1 = 1 , x2 = 1
y = 0.016574845744291834
v01= 0.3739188535601347 v11= 0.02294447997160053 v21= -0.33611174923915816
v02= -0.32253211418326194 v12= 0.4678036684934865 v22= -0.86525763997551484
w01= 0.004894611880655385 w11= -0.07195583709041938 w21= 0.12213449914539426

x1 = 1 , x2 = -1
y = -0.0037973262582434676
v01= 0.37312719058345733 v11= 0.02266667386427397 v21= -0.3361944636965486
v02= -0.3218163867447658 v12= 0.4675355688793784 v22= -0.86509927389845509
w01= 0.029989182376037305 w11= -0.06314894883934989 w21= 0.12475642754136554

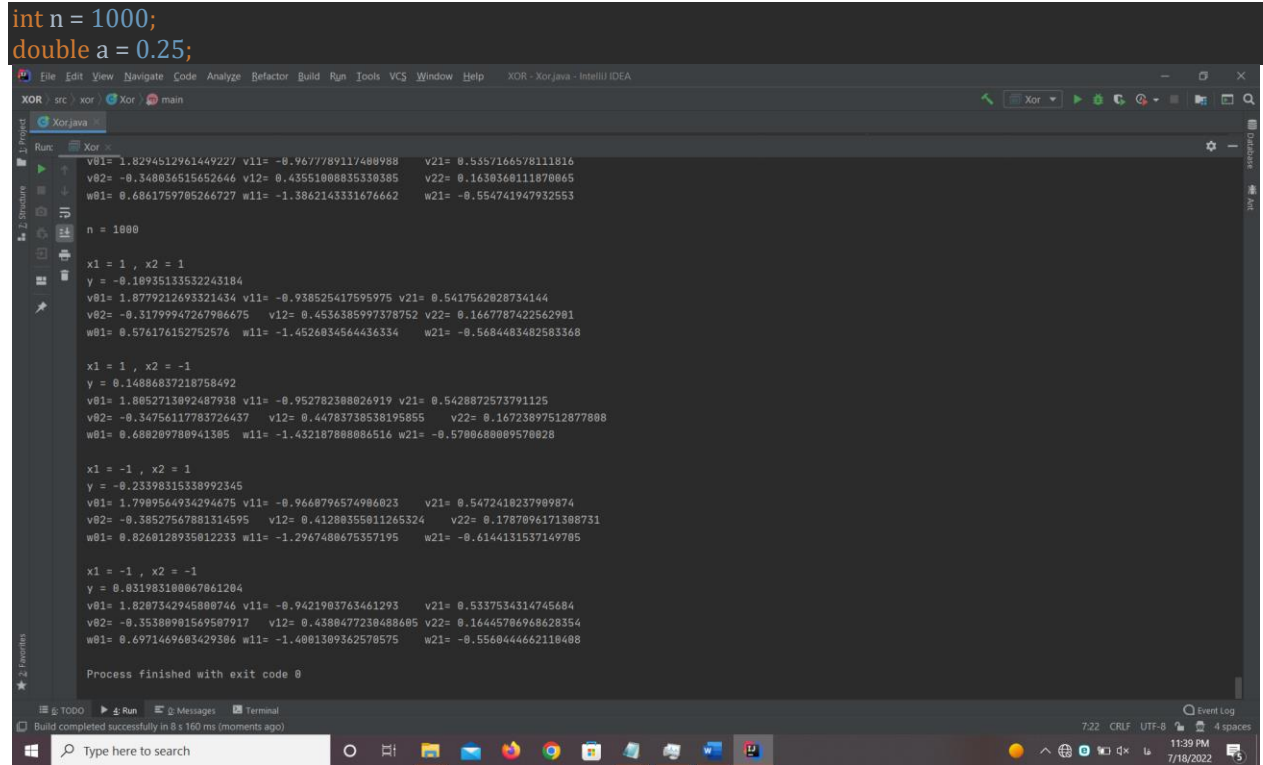
x1 = -1 , x2 = 1
y = -0.01814778171866145
v01= 0.37232978631664147 v11= 0.022668985255247304 v21= -0.33587337692463477
v02= -0.31969640898497365 v12= 0.46754497621358984 v22= -0.86563878598608372
w01= 0.05524517238421281 w11= -0.06296881223984471 w21= 0.11458672394399831

x1 = -1 , x2 = -1
y = -0.0025847592642608954
v01= 0.3738293889587385 v11= 0.022891818488427015 v21= -0.33611538568554816
v02= -0.328954070260678 v12= 0.46713880941962257 v22= -0.8651957298519231
w01= 0.03838995787861251 w11= -0.07119616277384143 w21= 0.12321239219256772

Process finished with exit code 0

Build completed successfully in 16 s 942 ms (a minute ago)
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11:37 PM
7/18/2022
```

```
int n = 1000;
double a = 0.25;
```



```
Xor =
v01= 1.8294512961449227 v11= -0.9677789117480988 v21= 0.5357166578111816
v02= -0.348836515652646 v12= 0.43551888835338585 v22= 0.1638368111878845
w01= 0.6861759785266727 w11= -1.3862143331676662 w21= -0.554741947932553

n = 1888

x1 = 1 , x2 = 1
y = -0.18935133532243184
v01= 1.8779212693321434 v11= -0.938525417595975 v21= 0.5417562828734144
v02= -0.31799947267986675 v12= 0.4536385997378752 v22= 0.1667787422562981
w01= 0.576176152752576 w11= -1.4526834564436334 w21= -0.5684483482583368

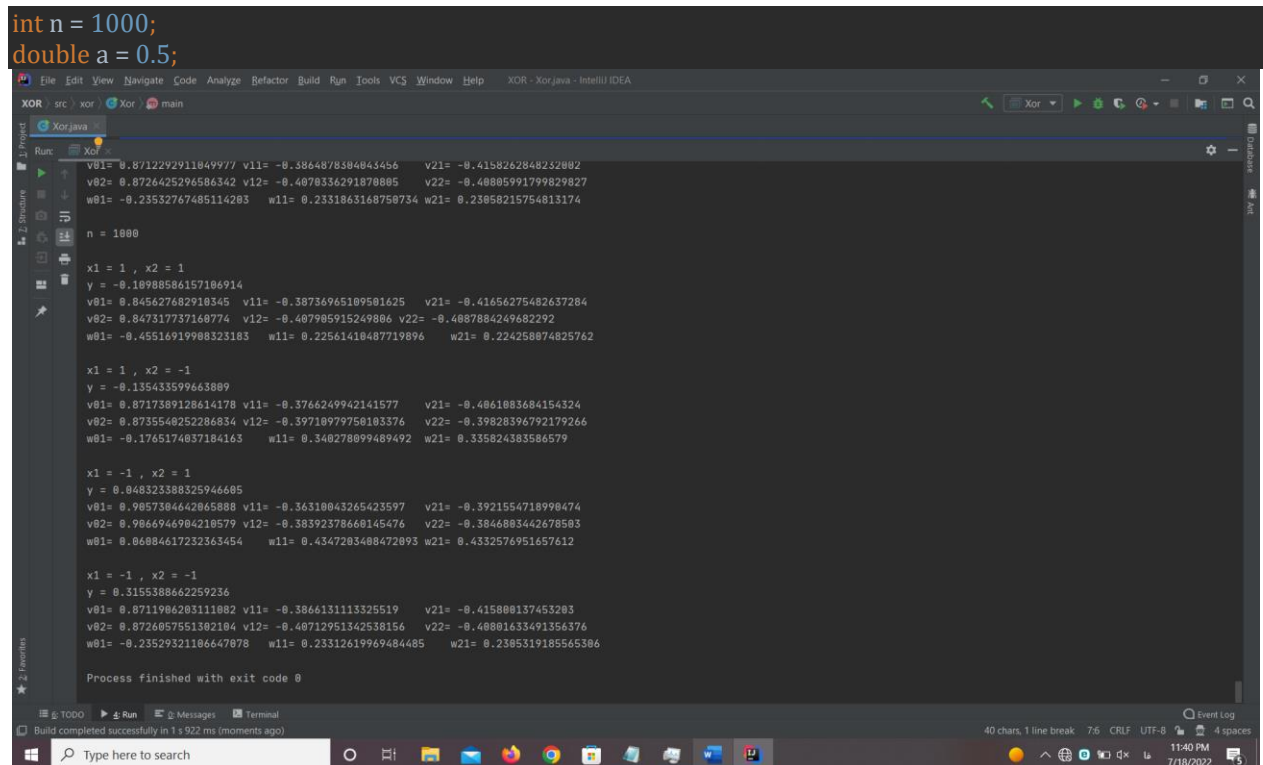
x1 = 1 , x2 = -1
y = 0.14886837218758492
v01= 1.8852713092487938 v11= -0.952782388026919 v21= 0.5428872573791125
v02= -0.34756117783726437 v12= 0.44783738538195855 v22= 0.16723897512877888
w01= 0.688289780941385 w11= -1.432187888886516 w21= -0.578688889578828

x1 = -1 , x2 = 1
y = -0.25398315338992345
v01= 1.7989564934294675 v11= -0.9668796574986823 v21= 0.5472418237989874
v02= -0.38527567881314595 v12= 0.41288355811265324 v22= 0.1787896171388731
w01= 0.8268128935812233 w11= -1.2967488675357195 w21= -0.6144131537149785

x1 = -1 , x2 = -1
y = 0.831983188067861284
v01= 1.8207342945880746 v11= -0.9421983763461293 v21= 0.5337534314745684
v02= -0.35388981569587917 v12= 0.4388477238488485 v22= 0.16445786968428354
w01= 0.6971469683429386 w11= -1.4881389362578575 w21= -0.5568444662118488

Process finished with exit code 0
```

```
int n = 1000;
double a = 0.5;
```



```
Xor =
v01= 0.8712292911849977 v11= -0.3864878584843456 v21= -0.4158262848232882
v02= 0.8726425294586342 v12= -0.48783334291878885 v22= -0.48885991799829827
w01= -0.23532767485114283 w11= 0.2331863168758734 w21= 0.23858215754813174

n = 1888

x1 = 1 , x2 = 1
y = -0.18988586157106914
v01= 0.845627682918345 v11= -0.38736965189581625 v21= -0.41656275482637284
v02= 0.847317737168774 v12= -0.487985915249886 v22= -0.4887884249682292
w01= -0.45516919988323183 w11= 0.22561418487719896 w21= 0.224258874825762

x1 = 1 , x2 = -1
y = -0.135433599663889
v01= 0.8717389128614178 v11= -0.3766249942141577 v21= -0.4861883684154324
v02= 0.8735548252286834 v12= -0.397189797758183376 v22= -0.39828396792179266
w01= -0.1765174837184163 w11= 0.348278899489492 w21= 0.335824383586579

x1 = -1 , x2 = 1
y = 0.848323388325946685
v01= 0.9857384642865888 v11= -0.36318843265423597 v21= -0.3921554718998474
v02= 0.9864946984210579 v12= -0.38392378668145476 v22= -0.3846883442678583
w01= 0.86884617232363454 w11= 0.4347283488472893 w21= 0.4332576951657612

x1 = -1 , x2 = -1
y = 0.3155388662259236
v01= 0.8711986283111882 v11= -0.3866131113325519 v21= -0.415888137453283
v02= 0.8724857551302104 v12= -0.48712951342538156 v22= -0.48881633491356376
w01= -0.23529321186647878 w11= 0.23312619969484485 w21= 0.2385319185565386

Process finished with exit code 0
```

```
int n = 10000;  
double a = 0.05;
```

```
Xor.java  
n = 10000  
  
x1 = 1, x2 = 1  
y = 0.02000013452690349  
v81= 6.758691350118995 v11= 6.824479191952556 v21= 6.75019188778743  
v82= 5.946327626435814 v12= -2.984845883328944 v22= 6.1998848945267425  
w81= 0.24188661892110247 w11= 2.2286808134228266 w21= -2.4310327626357116  
  
x1 = 1, x2 = -1  
y = 0.981447266966191  
v81= 6.758691430741619 v11= 6.824479272401241 v21= 6.750191813339898  
v82= 5.946336372360802 v12= -2.984956258351625 v22= 6.199899925720994  
w81= 0.2164138662435662 w11= 2.283287224111319 w21= -2.45653327919823  
  
x1 = -1, x2 = 1  
y = -0.0212833438953517  
v81= 6.758691366087147 v11= 6.824619157443631 v21= 6.750332848523846  
v82= 5.946336358924255 v12= -2.9849562867281273 v22= 6.19989989253459  
w81= 0.2419324719610827 w11= 2.2286628997382225 w21= -2.4310146883178563  
  
x1 = -1, x2 = -1  
y = -0.9671594083523403  
v81= 6.75869140747104 v11= 6.824619415413665 v21= 6.750331824839807  
v82= 5.946332208010879 v12= -2.984972116111596 v22= 6.199113663940894  
w81= 0.2418794322062081 w11= 2.2287158233688877 w21= -2.431060742313746  
  
Process finished with exit code 0
```

```
int n = 10000;  
double a = 0.25;
```

```
Xor.java  
n = 10000  
  
x1 = 1, x2 = 1  
y = 0.10225879749807293  
v81= 6.157778242724441 v11= 6.49262151169746 v21= 2.5452227058764056  
v82= -8.080216573784326 v12= -8.673138374831133 v22= 7.960988140122156  
w81= -0.08166648588437629 w11= 2.982517966642528 w21= 2.6965183749846493  
  
x1 = 1, x2 = -1  
y = -0.10225879749807293  
v81= 6.157778038144171 v11= 6.492621387117283 v21= 2.545222910389365  
v82= -8.080357515864184 v12= -8.673259316138146 v22= 7.9611098416985785  
w81= -0.21888730847869932 w11= 2.846177228641361 w21= 2.8328143312683167  
  
x1 = -1, x2 = 1  
y = 0.9867858492987965  
v81= 6.15783386762657 v11= 6.492671725085124 v21= 2.54521450978555  
v82= -8.080357472938479 v12= -8.67325928232754 v22= 7.9611098837783795  
w81= -0.08163874732493515 w11= 2.9825259558754333 w21= 2.696533552867985  
  
x1 = -1, x2 = -1  
y = -0.9913583695852234  
v81= 6.157827407582485 v11= 6.492676711987701 v21= 2.5452208022863418  
v82= -8.080357541371375 v12= -8.67325922114885 v22= 7.961109152189785  
w81= -0.08165733610211717 w11= 2.982542568722826 w21= 2.69655211624972  
  
Process finished with exit code 0
```

```
int n = 10000;  
double a = 0.5;
```

```
Xor.java  
n = 10000  
  
x1 = 1, x2 = 1  
y = 0.026238358937730545  
v81= -0.09833815010592205 v11= -0.3297517668131348 v21= -0.3721655445148242  
v82= -0.5758354801039841 v12= -0.446437894680112 v22= -0.22746851486148187  
w81= -0.4498665439431273 w11= -0.5522151365315953 w21= 0.32740885747695974  
  
x1 = 1, x2 = -1  
y = -0.18685684789741322  
v81= -0.1693573569969994 v11= -0.3278586561829783 v21= -0.3868868337667811  
v82= -0.6204568537946383 v12= -0.44752528174794804 v22= -0.21946635889164856  
w81= -0.16271225157924984 w11= -0.5598754984131634 w21= 0.37784961657463856  
  
x1 = -1, x2 = 1  
y = 0.025977351832656297  
v81= -0.2365871784379894 v11= -0.3282583835275761 v21= -0.4129811827977772  
v82= -0.6598555344563542 v12= -0.44518986719998473 v22= -0.28488714644184486  
w81= 0.08862988728798527 w11= -0.5866478791263615 w21= 0.4753185978123487  
  
x1 = -1, x2 = -1  
y = 0.18558383959915466  
v81= -0.16108627350174484 v11= -0.38189448370174826 v21= -0.36948784567868396  
v82= -0.6157825163487688 v12= -0.4624498685598588 v22= -0.22908815441688754  
w81= -0.1926854739710848 w11= -0.6531659421191169 w21= 0.31769436118324645  
  
Process finished with exit code 0
```

```
int n = 25000;  
double a = 0.05;
```

```
Xor.java  
n = 25000  
  
x1 = 1, x2 = 1  
y = -0.9813172447837951  
v81= -5.728272805480776 v11= 6.076535369976206 v21= -2.462980938188878  
v82= -7.896124464674635 v12= 7.932448241782587 v22= 7.982638686518864  
w81= 0.04429261422258524 w11= 2.6875365595032817 w21= -2.6854881668444743  
  
x1 = 1, x2 = -1  
y = 0.9878424228587741  
v81= -5.728269623686474 v11= 6.076537483593255 v21= -2.462983318157322  
v82= -7.896124481327228 v12= 7.932448227804987 v22= 7.982638623158691  
w81= 0.0442836653578377 w11= 2.6875575808045577 w21= -2.6855857779164383  
  
x1 = -1, x2 = 1  
y = -0.01982862892787823  
v81= -5.7282695358314095 v11= 6.0765373957383835 v21= -2.462983485948933  
v82= -7.896172423255374 v12= 7.932488168871639 v22= 7.98268653846881  
w81= 0.06976916496688275 w11= 2.662872833263837 w21= -2.638972878461688  
  
x1 = -1, x2 = -1  
y = 0.019567746942524167  
v81= -5.72828152254197 v11= 6.076549388338362 v21= -2.4628914192383737  
v82= -7.8961724232487525 v12= 7.932488148865818 v22= 7.982686538454188  
w81= 0.04428973102198306 w11= 2.6875469448353122 w21= -2.6854934365193048  
  
Process finished with exit code 0
```



```
int n = 25000;  
double a = 0.25;
```

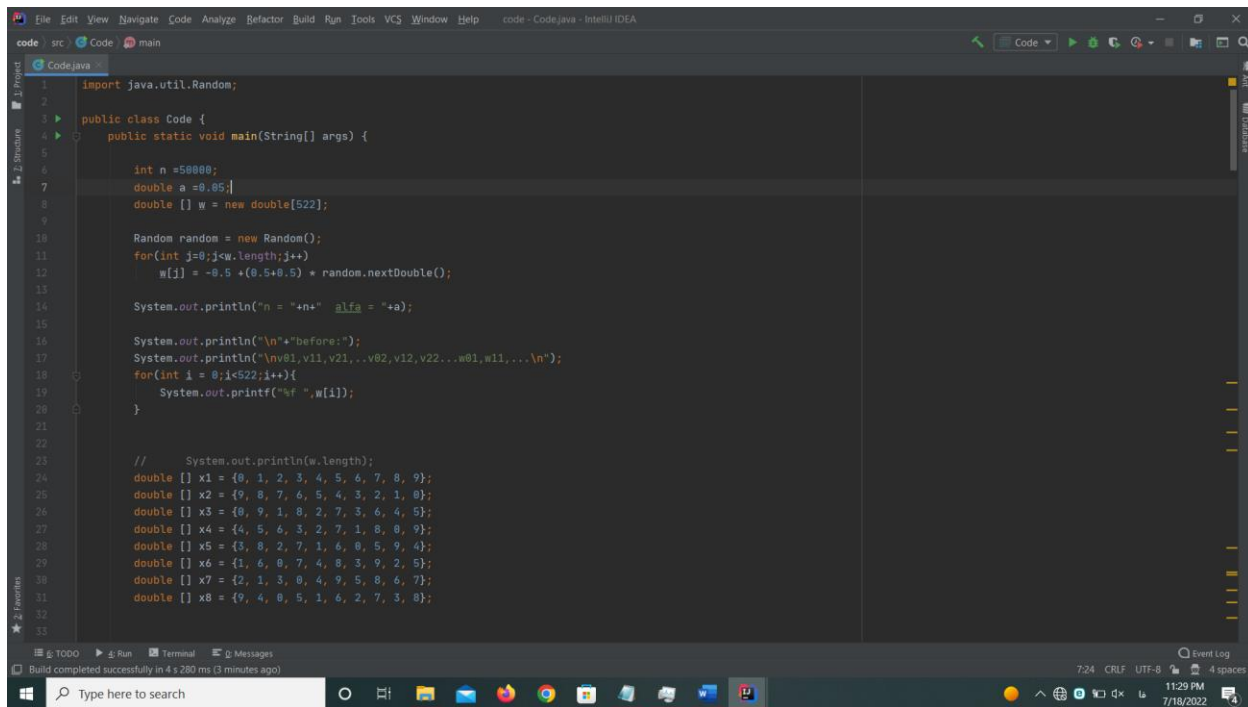
```
XOR - Xor -  
v81= 0.12593823119867743 v11= -0.24129963871978544 v21= 0.58231118984406585  
v82= 0.4418583817568103 v12= 0.32841894884448986 v22= -0.16863932514947817  
w81= 0.07998645838191434 w11= -0.3645524779362682 w21= -0.26147818854928955  
  
n = 25000  
  
x1 = 1 , x2 = 1  
y = -0.01516998552088647  
v81= 0.1481778767339475 v11= -0.23922689933813352 v21= 0.3887988180818228  
v82= 0.4557728726157186 v12= 0.3297918547229243 v22= -0.16434512858792516  
w81= -0.04316897183106397 w11= -0.3768235444334537 w21= -0.29737826731317263  
  
x1 = 1 , x2 = -1  
y = -0.050196487214595714  
v81= 0.1245164735953429 v11= -0.23455861837228276 v21= 0.2983544658924765  
v82= 0.4401892054869274 v12= 0.33288137287358085 v22= -0.17127113789358311  
w81= 0.08777481822387748 w11= -0.48185984222837485 w21= -0.23947578888499225  
  
x1 = -1 , x2 = 1  
y = -0.01684469284697118  
v81= 0.10157338484292436 v11= -0.24183975874271638 v21= 0.29986987115995854  
v82= 0.4249213188357936 v12= 0.3288613917828878 v22= -0.17078496288829926  
w81= 0.21474778958537848 w11= -0.36156331648246575 w21= -0.24354827357941505  
  
x1 = -1 , x2 = -1  
y = 0.08694719253242153  
v81= 0.12593823120611475 v11= -0.24129963872428236 v21= 0.38231118911725423  
v82= 0.44185838174994884 v12= 0.3284189488425875 v22= -0.16863932514552532  
w81= 0.07998645838354138 w11= -0.3645524779846522 w21= -0.26147818855159887  
  
Process finished with exit code 0
```

```
int n = 25000;  
double a = 0.5;
```

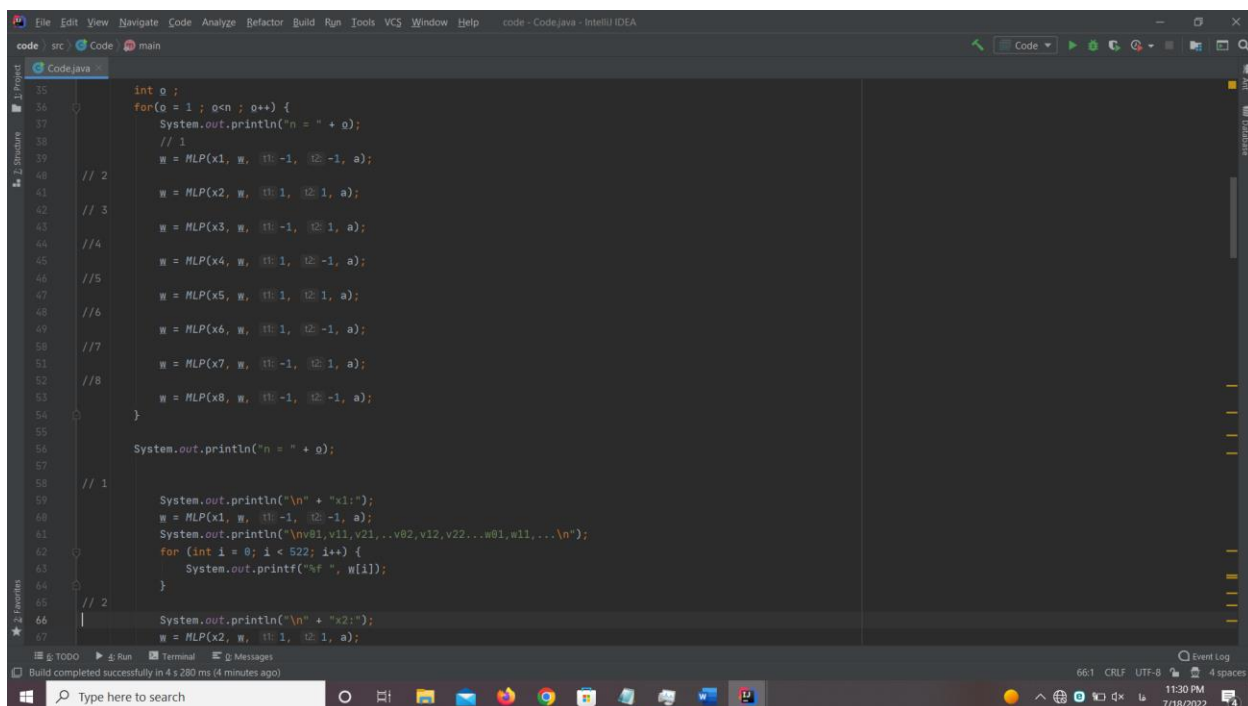
```
XOR - Xor -  
v81= -55.84988666185778 v11= -56.239498221925756 v21= 0.06933657695885689  
v82= 4.669173689344028 v12= 0.015323878666663819 v22= -1.4678787841527357  
w81= -0.12848457341069935 w11= -0.4174788866626165 w21= -0.01782397288928351  
  
n = 25000  
  
x1 = 1 , x2 = 1  
y = 0.13935885129424241  
v81= -55.83988666183778 v11= -56.239498221925756 v21= 0.06933657695885689  
v82= 4.66954232833414 v12= 0.0149551596765514 v22= -1.4667394679546795  
w81= -0.39979244566508676 w11= -0.1381718144082291 w21= -0.2756164887934216  
  
x1 = 1 , x2 = -1  
y = -0.2617935861241659  
v81= -55.83988666183778 v11= -56.239498221925756 v21= 0.06933657695885689  
v82= 4.669198645554055 v12= 0.01529882245663629 v22= -1.4678816692651225  
w81= -0.10596358854853555 w11= -0.4319998715247883 w21= 0.01696283177123442  
  
x1 = -1 , x2 = 1  
y = -0.09471581364896567  
v81= -55.89447344925422 v11= -56.252285431832135 v21= 0.0182699479842136  
v82= 4.669549162487897 v12= 0.015379675919378444 v22= -1.466758977115499  
w81= -0.16526816761272677 w11= -0.3694333338018321 w21= -0.26667851436133926  
  
x1 = -1 , x2 = -1  
y = 0.1822598723838861  
v81= -55.84318388947864 v11= -56.24364864054876 v21= 0.06933477472793738  
v82= 4.669215893374681 v12= 0.015323633869744713 v22= -1.4678987854413717  
w81= -0.12848652798053272 w11= -0.41748488288195683 w21= -0.017823695141605977  
  
Process finished with exit code 0
```

(2)

این کد تعمیم یافته کد قبلی است و مراحل هم شبیه قبلی  
کد:



```
1 import java.util.Random;
2
3 public class Code {
4     public static void main(String[] args) {
5
6         int n = 50000;
7         double a = 0.05;
8         double [] w = new double[522];
9
10        Random random = new Random();
11        for(int j=0;j<w.length;j++){
12            w[j] = -0.5 +(0.5+0.5) * random.nextDouble();
13        }
14
15        System.out.println("n = "+n+"   afa = "+a);
16
17        System.out.println("\n"+"before:");
18        System.out.println("\nv01,v11,v21,...v02,v12,v22...w01,w11,...\n");
19        for(int i = 0;i<522;i++){
20            System.out.printf("%f ",w[i]);
21        }
22
23        //        System.out.println(w.length);
24        double [] x1 = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9};
25        double [] x2 = {9, 8, 7, 6, 5, 4, 3, 2, 1, 0};
26        double [] x3 = {0, 9, 1, 8, 2, 7, 3, 6, 4, 5};
27        double [] x4 = {4, 5, 6, 3, 2, 7, 1, 8, 0, 9};
28        double [] x5 = {3, 8, 2, 7, 1, 6, 0, 5, 9, 4};
29        double [] x6 = {1, 6, 0, 7, 4, 8, 3, 9, 2, 5};
30        double [] x7 = {2, 1, 3, 0, 4, 9, 5, 8, 6, 7};
31        double [] x8 = {9, 4, 0, 5, 1, 6, 2, 7, 3, 8};
```



```
35 int o ;
36 for(o = 1 ; o<n ; o++) {
37     System.out.println("n = " + o);
38     // 1
39     w = MLP(x1, w, 11, -1, 12, -1, a);
40
41     // 2
42     w = MLP(x2, w, 11, 1, 12, 1, a);
43
44     // 3
45     w = MLP(x3, w, 11, -1, 12, 1, a);
46
47     // 4
48     w = MLP(x4, w, 11, 1, 12, -1, a);
49
50     // 5
51     w = MLP(x5, w, 11, 1, 12, 1, a);
52
53     // 6
54     w = MLP(x6, w, 11, 1, 12, -1, a);
55
56     // 7
57     w = MLP(x7, w, 11, -1, 12, 1, a);
58
59     // 8
60     w = MLP(x8, w, 11, -1, 12, -1, a);
61 }
62
63 System.out.println("n = " + o);
64
65 // 1
66 System.out.println("\n" + "x1:");
67 w = MLP(x1, w, 11, -1, 12, -1, a);
68 System.out.println("\nv01,v11,v21,...v02,v12,v22...w01,w11,...\n");
69 for (int i = 0; i < 522; i++) {
70     System.out.printf("%f ", w[i]);
71 }
72
73 // 2
74 System.out.println("\n" + "x2:");
75 w = MLP(x2, w, 11, 1, 12, 1, a);
```



```
code - Code.java - IntelliJ IDEA
code src Code main
Code java
1 Project
2 Favorites
3 Structure
4 Database
5 Run
6 Build
7 Run
8 Terminal
9 Messages
10 Event Log
11 97:1 CRLF UTF-8 4 spaces
12 11:30 PM 7/18/2022
13 Type here to search
14
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code - Code.java - IntelliJ IDEA
code src Code MLP
Code
129 for (int n = 0; n < 11; n++)
130     ws[n] = we[n + u];
131
132 u = u + 11;
133 z[i1] = feed(x, ws);
134 }
135
136 u = 448;
137 double [] wss = new double[41];
138 for (int n = 0; n <= 40; n++)
139     wss[n] = we[n + u];
140 double y1 = feed(z, wss);
141 System.out.println("y1 = " + y1);
142 u = 481;
143 for (int n = 0; n <= 40; n++) {
144     wss[n] = we[n + u];
145 }
146 double y2 = feed(z, wss);
147 System.out.println("y2 = " + y2);
148
149 double e1 = error(t1 - y1, y1);
150 double e2 = error(t2 - y2, y1);
151
152 double [] ez = new double[40];
153 for (int k = 0; k < 10; k++) {
154     ez[k] = error(t1 - e1 + we[448 + k] + e2 + we[481 + k], z[8]);
155 }
156 double [] weight = new double[522];
157
158 weight[448] = weight(a, e1, t1) + we[448];
159 for (int i = 0; i < 40; i++)
160     weight[441 + i] = weight(a, e1, z[i]) + we[441];
161
162 Build completed successfully in 4 s 280 ms (6 minutes ago)
159:11 CRLF UTF-8 4 spaces
11:32 PM 7/18/2022
```

```
code - Code.java - IntelliJ IDEA
code src Code error
Code
162 // weight w (x2->y) 40
163 // bayes
164 weight[481] = weight(a, e2, t1) + we[481];
165 for (int i = 0; i < 40; i++)
166     weight[482 + i] = weight(a, e2, z[i]) + we[482 + i];
167 // weight v (x -> z)
168 int k = 0;
169 for (int p = 0; p < 40; p++) {
170     // bayes
171     weight[8 + k] = weight(a, ez[p], t1) + we[8 + k];
172     for (int i = 0; i < 10; i++)
173         weight[i + 1 + k] = weight(a, ez[p], z[p]) + we[i + 1 + k];
174     k = k + 11;
175 }
176
177 return weight;
178
179 }
180
181 public static double feed(double [] x, double [] t){
182     int i, j;
183     double y_in = w[0];
184     for (i = 0; i < x.length; i++) {
185         y_in = x[i] * w[i + 1] + y_in;
186     }
187     // double y_in = w[0] + x[0]*w[1] + x[1]*w[2] + x[2]*w[3] + x[3]*w[4] + x[4]*w[5] + x[5]*w[6];
188     double y = (1 - Math.exp(-y_in)) / (1 + Math.exp(-y_in));
189     // double y = 1 / (1 + Math.exp(-y_in));
190     return y;
191 }
192
193 public static double error(double t, double y){
194     double e1 = t * 0.5 * (1 + y) * (1 - y);
195     // double e1 = t * 0.5 * y * (1 - y);
196 }
197
198 Build completed successfully in 4 s 280 ms (6 minutes ago)
193:11 CRLF UTF-8 4 spaces
11:32 PM 7/18/2022
```

```
code - Code.java - IntelliJ IDEA
code src Code
Code.java
172     for (int i = 0; i < 10; i++)
173         weight[i + i + k] = weight(a, ez[p], z[p]) + w[i+i];
174         k = k + 1;
175     }
176
177     return weight;
178
179 }
180
181 public static double feed( double x [], double w []){
182     int i , j;
183     double y_in = w[0];
184     for(i = 0 ; i<x.length ; i++) {
185         y_in = x[i] + w[i + 1] + y_in;
186     }
187     // double y_in = w[0] + x[0]*w[1] + x[1]*w[2] + x[2]*w[3] + x[3]*w[4] + x[4]*w[5] + x[5]*w[6];
188     double y = (1- Math.exp(-y_in))/(1+ Math.exp(-y_in));
189     // double y = 1/(1+ Math.exp(-y_in));
190     return y;
191 }
192
193 public static double error(double t , double y){
194     double e1 = t*0.5*(1+y)*(1-y);
195     // double e1 = t*0.5*y*(1-y);
196
197     return e1;
198 }
199
200 public static double weight(double a , double e , double z){
201     double w = a*e*z;
202     return w;
203 }
```

خروجی:

```
int n=5000;
double a
code - Code.java - IntelliJ IDEA
code src Code
Code.java
Run: Code
x1:
y1 = -0.9999999937178675
y2 = 0.9857878478117514
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.419924 -0.069040 0.020057 0.415453 -0.518900 0.381715 -0.270885 -0.527417 -0.365800 0.275399 -0.521787 0.372567 -0.069040 0.020057 0.415453 -0.518900 0.381715 -0.270885 -0.5274
x2:
y1 = -0.999999652266796
y2 = 0.9119511768082817
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.419925 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.527418 -0.365801 0.275398 -0.521787 0.372568 -0.069041 0.020057 0.415453 -0.518901 0.381715 -0.270886 -0.5274
x3:
y1 = -0.999999937520475
y2 = 0.9857880566561225
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.419925 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.527418 -0.365801 0.275398 -0.521787 0.372568 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.5274
x4:
y1 = -0.9999999937044687
y2 = 0.9857956214663009
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.419925 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.527418 -0.365801 0.275398 -0.521787 0.372568 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.5274
x5:
y1 = -0.9999999924103827
y2 = 0.9864552133354444
```

```
code - Code.java - IntelliJ IDEA
code src \ Code
Run: Code
0.419925 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.527418 -0.365801 0.275398 -0.521787 0.372568 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.5274
x5:
y1 = -0.99999999924103827
y2 = 0.9064552133354444
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.419925 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.527418 -0.365801 0.275398 -0.521787 0.372568 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.5274
x6:
y1 = -0.99999999937621865
y2 = 0.9057621738184207
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.419925 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.527418 -0.365801 0.275398 -0.521787 0.372568 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.5274
x7:
y1 = -0.9999999993625917
y2 = 0.9058760900739555
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.419925 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.527418 -0.365801 0.275398 -0.521787 0.372568 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.5274
x8:
y1 = -0.9999999993762959
y2 = 0.9057617020776401
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.419925 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.527418 -0.365801 0.275398 -0.521787 0.372568 -0.069041 0.020056 0.415452 -0.518901 0.381714 -0.270886 -0.5274
Process finished with exit code 0
Build completed successfully in 3 s 296 ms (3 minutes ago)
```

```
int n=5000;
double a=0.05;
code - Code.java - IntelliJ IDEA
code src \ Code \ main
Run: Code
x1:
y1 = -0.3631056166137967
y2 = -0.34756808426409356
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.685489 0.585808 -0.212671 -0.217393 0.298196 0.356172 0.309838 0.325244 0.666954 0.335831 -0.044389 -0.488201 0.585808 -0.212671 -0.217393 0.298197 0.356172 0.309839 0.325244 0
x2:
y1 = -0.5887955181511145
y2 = -0.5734708505215695
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.685492 0.585811 -0.212668 -0.217391 0.298199 0.356175 0.309841 0.325247 0.666956 0.335833 -0.044387 -0.488201 0.585808 -0.212671 -0.217394 0.298196 0.356172 0.309838 0.325244 0
x3:
y1 = -0.12624706106345696
y2 = -0.11783803826995706
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.685491 0.585810 -0.212669 -0.217392 0.298198 0.356174 0.309840 0.325246 0.666955 0.335832 -0.044388 -0.488202 0.585810 -0.212669 -0.217391 0.298198 0.356174 0.309840 0.325246 0
x4:
y1 = -0.5133867691386015
y2 = 0.41793822623176596
v01,v11,v21,...v02,v12,v22...w01,w11,...
0.685493 0.585812 -0.212667 -0.217390 0.298200 0.356176 0.309842 0.325248 0.666957 0.335834 -0.044386 -0.488201 0.585810 -0.212669 -0.217391 0.298198 0.356174 0.309840 0.325246 0
x5:
y1 = 0.003461487982139119
y2 = -0.08969100164855856
Build completed successfully in 11 s 69 ms (a minute ago)
```

```
code - Code.java - IntelliJ IDEA
code - src - Code - main
Run: Code
0.685493 0.585812 -0.212667 -0.217398 0.298201 0.356176 0.309843 0.325248 0.666957 0.335834 -0.044386 -0.488201 0.585810 -0.212669 -0.217391 0.298198 0.356174 0.309840 0.325246 0
x5:
y1 = 0.003461487982139119
y2 = -0.00969100164855856
v01,v11,v21,...v02,v12,v22,...w01,w11,...
0.685494 0.585813 -0.212666 -0.217388 0.298201 0.356177 0.309843 0.325249 0.666959 0.335836 -0.044385 -0.488202 0.585811 -0.212668 -0.217390 0.298200 0.356175 0.309842 0.325247 0
x6:
y1 = 0.47318826059255015
y2 = 0.4368826558647869
v01,v11,v21,...v02,v12,v22,...w01,w11,...
0.685494 0.585813 -0.212666 -0.217388 0.298201 0.356177 0.309843 0.325249 0.666959 0.335836 -0.044385 -0.488202 0.585813 -0.212666 -0.217388 0.298201 0.356177 0.309843 0.325249 0
x7:
y1 = 0.6192133964924558
y2 = -0.10277705020361224
v01,v11,v21,...v02,v12,v22,...w01,w11,...
0.685494 0.585813 -0.212666 -0.217388 0.298201 0.356177 0.309843 0.325249 0.666959 0.335835 -0.044385 -0.488202 0.585813 -0.212666 -0.217388 0.298201 0.356177 0.309843 0.325249 0
x8:
y1 = 0.2889465649319457
y2 = 0.24051936527132387
v01,v11,v21,...v02,v12,v22,...w01,w11,...
0.685494 0.585813 -0.212666 -0.217388 0.298201 0.356177 0.309843 0.325249 0.666959 0.335835 -0.044385 -0.488202 0.585813 -0.212666 -0.217388 0.298201 0.356177 0.309843 0.325249 0
Process finished with exit code 0
Build completed successfully in 11 s 69 ms (a minute ago)
41825:1 CRLF UTF-8 4 spaces
11:21 PM
7/18/2022
```

```
int n=50000;
double a=0.5;
code - Code.java - IntelliJ IDEA
code - src - Code - main
Run: Code
x1:
y1 = -0.9999688822862549
y2 = -0.9999989094391765
v01,v11,v21,...v02,v12,v22,...w01,w11,...
3.381765 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.048388 -0.042807 0.048092 -0.257746 -0.891437 0.391211 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.048388 -0.
x2:
y1 = -0.9999688822619739
y2 = -0.9999989094381554
v01,v11,v21,...v02,v12,v22,...w01,w11,...
3.381765 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.048388 -0.042807 0.048092 -0.257746 -0.891437 0.391211 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.048388 -0.
x3:
y1 = -0.9999688424022053
y2 = -0.999998908043647
v01,v11,v21,...v02,v12,v22,...w01,w11,...
3.381765 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.048388 -0.042807 0.048092 -0.257746 -0.891437 0.391211 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.048388 -0.
x4:
y1 = -0.9999688425627465
y2 = -0.9999989066511336
v01,v11,v21,...v02,v12,v22,...w01,w11,...
3.381765 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.048388 -0.042807 0.048092 -0.257746 -0.891437 0.391211 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.048388 -0.
x5:
y1 = -0.9999688015568032
y2 = -0.9999989066026965
Build completed successfully in 26 s 46 ms (a minute ago)
42525:4 CRLF UTF-8 4 spaces
11:24 PM
7/18/2022
```

```
code - Code.java - IntelliJ IDEA
src \ Code \ main
Run: Code
3.381765 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.842807 0.048092 -0.257746 -0.891437 0.391211 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.
x5:
y1 = -0.9999688015568032
y2 = -0.999998906026965
v01,v11,v21,...v02,v12,v22...w01,w11,...
3.381765 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.842807 0.048092 -0.257746 -0.891437 0.391211 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.
x6:
y1 = -0.9999687627869202
y2 = -0.9999989852508654
v01,v11,v21,...v02,v12,v22...w01,w11,...
3.381765 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.842807 0.048092 -0.257746 -0.891437 0.391211 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.
x7:
y1 = -0.9999687227799239
y2 = -0.9999989052517456
v01,v11,v21,...v02,v12,v22...w01,w11,...
3.381765 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.842807 0.048092 -0.257746 -0.891437 0.391211 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.
x8:
y1 = -0.9999687227809119
y2 = -0.9999989838437307
v01,v11,v21,...v02,v12,v22...w01,w11,...
3.381765 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.842807 0.048092 -0.257746 -0.891437 0.391211 -0.135482 0.019784 -0.019103 -0.081367 -0.920613 -0.848388 -0.
Process finished with exit code 0
Build completed successfully in 26 s 46 ms (a minute ago)
```

```
int n=50000;
double a=0.05;
code - Code.java - IntelliJ IDEA
src \ Code \ main
Run: Code
x1:
y1 = -0.9493907195137158
y2 = -0.017499218695556155
v01,v11,v21,...v02,v12,v22...w01,w11,...
-6.928429 0.550912 0.590750 0.281914 0.648436 0.257974 -0.015363 0.056205 0.085547 -0.208461 0.065793 -25.251922 0.565319 0.505157 0.276321 0.642843 0.252381 -0.020956 0.050612 0
x2:
y1 = 0.4097695332630203
y2 = 0.9145234868977399
v01,v11,v21,...v02,v12,v22...w01,w11,...
-6.928445 0.550896 0.590734 0.281899 0.648420 0.257959 -0.015378 0.056190 0.085531 -0.208477 0.065777 -25.251924 0.550914 0.590752 0.281916 0.648438 0.257976 -0.015361 0.056207 0
x3:
y1 = 0.5050838878919538
y2 = 0.41369550614630163
v01,v11,v21,...v02,v12,v22...w01,w11,...
-6.914712 0.564319 0.604157 0.295322 0.661843 0.271302 -0.001955 0.069613 0.090954 -0.187054 0.079201 -25.255050 0.554022 0.594660 0.285025 0.652346 0.261885 -0.011452 0.060116 0
x4:
y1 = 0.059551865097839
y2 = -0.6985503981271704
v01,v11,v21,...v02,v12,v22...w01,w11,...
-6.930104 0.549372 0.589210 0.280374 0.646896 0.256434 -0.016903 0.054665 0.084007 -0.202001 0.064253 -25.251917 0.560386 0.600224 0.291389 0.657911 0.267449 -0.005888 0.065680 0
x5:
y1 = 0.5469205076140712
y2 = 0.4121138017732191
v01,v11,v21,...v02,v12,v22...w01,w11,...
Build completed successfully in 4 s 280 ms (2 minutes ago)
```



```
code - Code.java - IntelliJ IDEA
src \ Code \ main
Run: Code
-6.938184 0.549372 0.589210 0.288374 0.646896 0.256434 -0.016983 0.054665 0.084087 -0.202081 0.064253 -25.251917 0.568386 0.608224 0.291389 0.657911 0.267449 -0.005888 0.065688 0
x5:
y1 = 0.5469205076148712
y2 = 0.4121138017732191
v01,v11,v21,...v02,v12,v22,...w01,w11,...
-6.931941 0.547639 0.587477 0.278641 0.645163 0.254701 -0.018636 0.052932 0.082273 -0.203735 0.062520 -25.261206 0.558661 0.598499 0.289663 0.656185 0.265723 -0.007614 0.063954 0
x6:
y1 = 0.5771863263453556
y2 = -0.7376438287188189
v01,v11,v21,...v02,v12,v22,...w01,w11,...
-6.944428 0.536814 0.575852 0.267016 0.633538 0.243076 -0.030261 0.041387 0.070649 -0.215359 0.058895 -25.256052 0.542485 0.582323 0.273487 0.648089 0.249547 -0.023798 0.047778 0
x7:
y1 = -0.0511403961507898
y2 = 0.47782398147189487
v01,v11,v21,...v02,v12,v22,...w01,w11,...
-6.942157 0.533827 0.573665 0.264838 0.631351 0.240898 -0.032447 0.039121 0.068462 -0.217546 0.048789 -25.258295 0.538256 0.578094 0.269258 0.635780 0.245318 -0.028019 0.043549 0
x8:
y1 = 0.664570883960447
y2 = -0.22196013508854342
v01,v11,v21,...v02,v12,v22,...w01,w11,...
-6.926315 0.548870 0.588708 0.279873 0.646394 0.255933 -0.017484 0.054164 0.083505 -0.202583 0.063752 -25.249966 0.525499 0.565337 0.256501 0.623023 0.232562 -0.048775 0.030793 0
Process finished with exit code 0
Build completed successfully in 4 s 280 ms (3 minutes ago)
42828.1 CRLF UTF-8 4 spaces
11:29 PM 7/18/2022
```