Table of Contents

```matlab
%Name: David George
%Student Num: 251004930




T = readtable("diabetes-pima.csv");
% Converting to binary

d = string(T.diabetic);
binaryVal = d == "Yes";
T.binaryDiabetic = binaryVal;

T = changeToNaN(T);
```
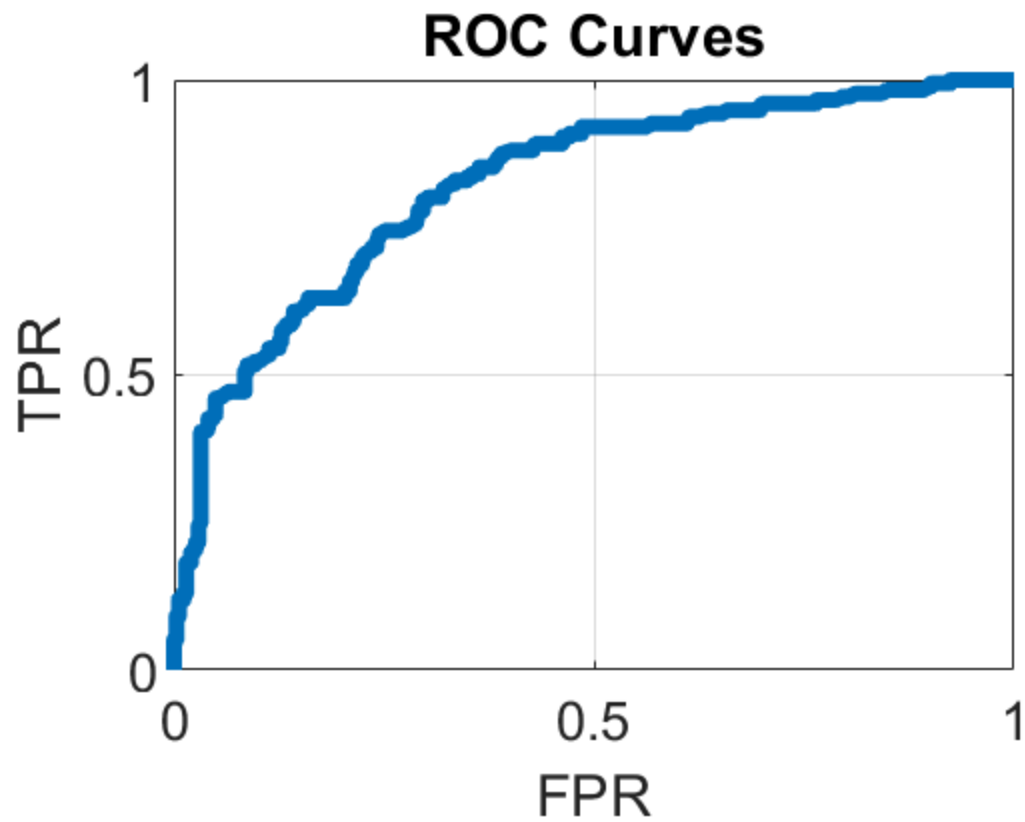
A)

```matlab
dp([1,2,6],["bmi","npreg","bp"],T);
```

zval =

*   -4.7036*
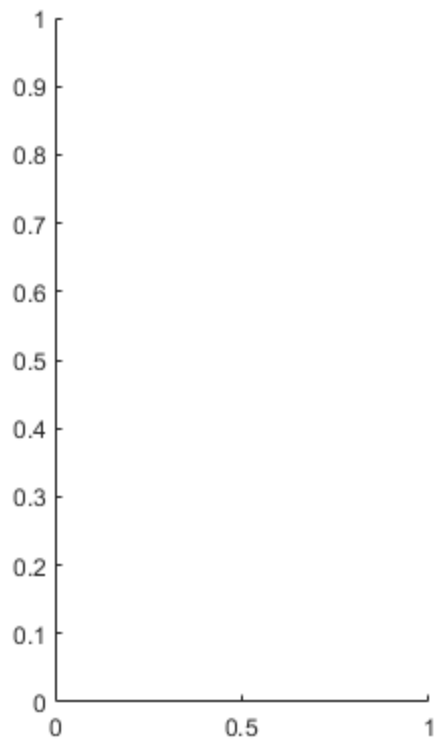

zval =

*   -4.4926*

B)

```matlab
ROC(["glu","npreg","bp"],T);
```

ROC Curves

C)

```
close all;
figure
subplot(1,2, 1);
ROC(["skin","npreg","age"],T)
subplot(1,2, 2);
ROC(["glu","npreg","bp","skin","age","bmi"],T)

% all is better as the area is higer
```

```matlab
function [AUC,fpr,tpr,threshholds] = ROC(var,t)
    p=[];
    names = var;
    if ismember("npreg",var)
        p = t.npreg;
    end

    if ismember("bmi",var)
        p = [p, t.bmi];
    end
    if ismember("age",var)
        p = [p, t.age];
    end

    if ismember("glu",var)
        p = [p, t.glu];
    end
    if ismember("bp",var)
        p = [p, t.bp];
    end
    if ismember("skin",var)
        p = [p, t.skin];
    end


    v = p;
```

```matlab
    a = zeros(length(v),1);

    i = 1;

    while i <= length(v)
         row = v(i,:);
        prob = dp(row,names,t);
        a(i) = prob;
        i = i+1;
    end

    r = t.binaryDiabetic;
    [fpr,tpr,thresholds,AUC, opt] = perfcurve(r, a, 1);



    plotHelp(fpr,tpr);



end

function plotHelp(fpr, tpr)

    plot(fpr,tpr, 'LineWidth',6);
    grid()
    xlabel("FPR")
    ylabel("TPR")
    title("ROC Curves")
    set(gca, 'FontSize', 20)



end

function y = dp(values,varName,t)

    p = [];

    if ismember("bp",varName)
        p = [p, t.bp];
    end

    if ismember("age",varName)
        p = [p, t.age];
    end
     if ismember("npreg",varName)
        p = t.npreg;
    end
    if ismember("glu",varName)
        p = [p, t.glu];
    end
```

```matlab
        if ismember("skin",varName)
            p = [p, t.skin];
        end
        if ismember("bmi",varName)
            p = [p, t.bmi];
        end



        r = glmfit(p,t.binaryDiabetic,'binomial');

        be = r;

        zval = be(1);

        i =2;

        while i <= length(be)
              bW = be(i);
            x = values(i-1);
            currentnum = x * bW;
            zval = zval + currentnum

        i = i+1;
        end



        y = 1 ./ (1 + exp(-zval));


    end

    function T = changeToNaN(T)


    for i = 1:6
            values = T(:,i);

            missing = ismissing(values,'NA');

            values = table2array(values);

            values(missing) = {NaN};
            T(:,i) = values;

    end
     T.npreg = str2double(T.npreg);
     T.skin  = str2double(T.skin);
            T.bmi = str2double(T.bmi);
            T.age = str2double(T.age);
            T.glu = str2double(T.glu);
            T.bp  = str2double(T.bp);
```

```
end
```

zval =

  -5.2675

zval =

   0.5932

zval =

  -6.0462

zval =

  -2.6802

zval =

  -6.0462

zval =

  -2.5218

zval =

  -5.7347

zval =

  -2.6460

zval =

  -5.8904

zval =

   1.9107

```
zval =

   -5.4233


zval =

    1.1503


zval =

   -6.2019


zval =

   -1.5292


zval =

   -6.0462


zval =

   -1.9674


zval =

   -5.7347


zval =

   -0.7452


zval =

   -4.8003


zval =

   -0.0880


zval =

   -6.0462
```

```
zval =

    -2.2050


zval =

    -5.4233


zval =

    -1.1069


zval =

    -5.7347


zval =

    -2.2500


zval =

    -4.6446


zval =

     0.1865


zval =

    -5.5790


zval =

    -1.5002


zval =

    -4.8003


zval =

    -0.7612
```

```
zval =

   -5.8904


zval =

   -2.3265


zval =

   -5.5790


zval =

   -1.1834


zval =

   -5.7347


zval =

    1.3932


zval =

   -5.1118


zval =

   -0.9143


zval =

   -4.8003


zval =

    1.9712


zval =
```

```
-6.2019

zval =

   0.9260

zval =

  -5.8904

zval =

  -3.0789

zval =

  -6.0462

zval =

  -1.9674

zval =

  -6.0462

zval =

  -2.0466

zval =

  -5.4233

zval =

  -1.9385

zval =

  -5.1118

zval =
```

```
     0.8281


zval =

   -6.0462


zval =

   -3.1554


zval =

   -6.2019


zval =

   -2.0440


zval =

   -5.4233


zval =

   -1.5029


zval =

   -6.2019


zval =

   -1.8856


zval =

   -6.0462


zval =

   -2.2842
```

```
zval =

   -5.5790


zval =

    0.2025


zval =

   -5.8904


zval =

   -1.9305


zval =

   -5.5790


zval =

    NaN


zval =

   -5.4233


zval =

   -1.6613


zval =

   -5.8904


zval =

   -1.4553


zval =

   -5.7347
```

```
zval =

   -1.2600


zval =

   -5.1118


zval =

   -1.8250


zval =

   -6.2019


zval =

   -2.2023


zval =

   -4.1774


zval =

    0.0201


zval =

   -5.8904


zval =

   -1.9305


zval =

   -3.8660


zval =

    1.5195
```

```
zval =

   -5.5790


zval =

   -0.7083


zval =

   -5.1118


zval =

   -1.9042


zval =

   -5.8904


zval =

   -2.2473


zval =

   -5.2675


zval =

   -1.5848


zval =

   -6.0462


zval =

   -1.2150


zval =
```

```
         -6.0462


zval =

   -2.8386


zval =

   -6.0462


zval =

   -1.0566


zval =

   -5.5790


zval =

    0.1233


zval =

   -6.0462


zval =

   -2.5218


zval =

   -5.1118


zval =

    1.2241


zval =

   -5.5790


zval =
```

```
                  -1.7378


zval =

    -6.2019


zval =

     0.2132


zval =

    -5.8904


zval =

    -1.6533


zval =

    -6.0462


zval =

    -2.5614


zval =

    -6.0462


zval =

    -1.4130


zval =

    -5.5790


zval =

     1.2717
```

```
zval =

   -5.7347


zval =

    0.9972


zval =

   -4.9561


zval =

   -1.6297


zval =

   -6.2019


zval =

    NaN


zval =

   -6.2019


zval =

   -2.5191


zval =

   -5.4233


zval =

   -1.2257


zval =

   -5.8904
```

```
zval =

   -1.6137


zval =

   -5.8904


zval =

   -1.6929


zval =

   -5.8904


zval =

   -2.3265


zval =

   -4.8003


zval =

    1.3772


zval =

   -6.0462


zval =

    0.0125


zval =

   -5.1118


zval =

    0.9073
```

```
zval =

   -5.8904


zval =

   -2.4057


zval =

   -3.5545


zval =

    2.9002


zval =

   -5.5790


zval =

    0.4005


zval =

   -5.1118


zval =

   -1.0727


zval =

   -6.2019


zval =

   -1.6876


zval =
```

```
                 -5.2675

zval =

    -1.1492

zval =

    -5.8904

zval =

    -2.9205

zval =

    -4.9561

zval =

     2.1322

zval =

    -6.2019

zval =

    -1.0936

zval =

    -6.0462

zval =

    -0.9774

zval =

    -4.9561

zval =
```

```
                              -0.6397


             zval =

                              -5.5790


             zval =

                              -1.2626


             zval =

                              -6.2019


             zval =

                              -1.7272


             zval =

                              -6.2019


             zval =

                              -1.9252


             zval =

                              -5.4233


             zval =

                              -1.0277


             zval =

                              -4.9561


             zval =

                               2.8054
```

```
zval =

   -5.8904


zval =

   -2.6829


zval =

   -6.2019


zval =

   -0.3808


zval =

   -5.4233


zval =

   -1.1069


zval =

   -5.2675


zval =

   -0.3176


zval =

   -5.4233


zval =

   -2.0573


zval =

   -5.1118
```

```
zval =

    0.5113


zval =

   -6.0462


zval =

   -2.0862


zval =

   -6.0462


zval =

   -2.6010


zval =

   -5.7347


zval =

    0.6804


zval =

   -5.5790


zval =

    2.2221


zval =

   -6.2019


zval =

   -1.5688
```

```
zval =

   -5.2675


zval =

    0.0388


zval =

   -5.7347


zval =

   -2.8044


zval =

   -5.1118


zval =

    2.0557


zval =

   -6.2019


zval =

    0.8864


zval =

   -6.0462


zval =

   -2.4426


zval =
```

```
                    -5.5790


            zval =

                    -1.9754


            zval =

                    -5.2675


            zval =

                    -0.5552


            zval =

                    -5.8904


            zval =

                    -0.1089


            zval =

                    -4.8003


            zval =

                     2.4860


            zval =

                    -6.2019


            zval =

                     0.3320


            zval =

                    -4.8003


            zval =
```

0.1100

zval =

-6.0462

zval =

-1.6506

zval =

-5.8904

zval =

-2.3265

zval =

-6.0462

zval =

-1.5714

zval =

-5.7347

zval =

-1.3392

zval =

-4.4889

zval =

1.6490

```
zval =

   -5.5790


zval =

   -1.8170


zval =

   -5.4233


zval =

   -1.6217


zval =

   -5.8904


zval =

   -0.8217


zval =

   -4.6446


zval =

   -0.6451


zval =

   -5.8904


zval =

   -1.6137


zval =

   -5.8904
```

```
zval =

   -1.9305


zval =

   -5.1118


zval =

   -0.9143


zval =

   -6.2019


zval =

   -2.0836


zval =

   -5.8904


zval =

   -1.6137


zval =

   -5.1118


zval =

    0.1549


zval =

   -5.1118


zval =

    NaN
```

```
zval =

   -6.0462


zval =

   -1.3338


zval =

   -5.5790


zval =

   -1.7774


zval =

   -6.2019


zval =

   -3.1131


zval =

   -6.2019


zval =

   -1.9648


zval =

   -5.2675


zval =

    0.7120


zval =
```

```
                         -5.8904

             zval =
                  -0.1089

             zval =
                  -6.2019

             zval =
                  -1.2124

             zval =
                  -5.8904

             zval =
                  -0.1881

             zval =
                  -5.8904

             zval =
                  -1.1385

             zval =
                  -4.6446

             zval =
                   1.7309

             zval =
                  -6.2019

             zval =
```

```
      -1.1332

zval =

   -5.8904

zval =

   -0.9801

zval =

   -5.8904

zval =

    0.2475

zval =

   -5.7347

zval =

   -1.2600

zval =

   -5.1118

zval =

   -0.7955

zval =

   -5.7347

zval =

   -1.1808
```

```
zval =

   -4.1774


zval =

    1.8417


zval =

   -5.8904


zval =

   -1.4553


zval =

   -6.0462


zval =

    0.1709


zval =

   -6.0462


zval =

   -1.2150


zval =

   -5.8904


zval =

   -1.8513


zval =

   -5.2675
```

```
zval =

   -1.1096


zval =

   -4.9561


zval =

   -0.2833


zval =

   -5.8904


zval =

   -2.4453


zval =

   -6.0462


zval =

   -2.2842


zval =

   -6.0462


zval =

   -0.8982


zval =

   -6.0462


zval =

   -2.2842
```

```
zval =

   -4.9561


zval =

    0.0335


zval =

   -6.0462


zval =

   -0.5418


zval =

   -5.7347


zval =

   -1.8144


zval =

   -6.0462


zval =

   -1.0962


zval =

   -6.0462


zval =

    1.7153


zval =
```

```
                -5.4233


      zval =

            2.0610


      zval =

            -5.4233


      zval =

            -1.3445


      zval =

            -5.5790


      zval =

             0.2421


      zval =

            -5.4233


      zval =

            -1.5029


      zval =

            -5.7347


      zval =

            -2.5272


      zval =

            -5.7347


      zval =
```

```
            1.1160


zval =

    -6.2019


zval =

    -2.8755


zval =

    -6.2019


zval =

    -2.3211


zval =

    -6.0462


zval =

    -2.6010


zval =

    -6.2019


zval =

    -2.5191


zval =

    -6.2019


zval =

    -2.0440
```

```
zval =

    -6.0462


zval =

    -2.4822


zval =

    -6.0462


zval =

    -1.0962


zval =

    -6.0462


zval =

    -1.3338


zval =

    -5.4233


zval =

    -0.8297


zval =

    -4.9561


zval =

    -0.7981


zval =

    -5.7347
```

```
zval =

   -1.7748


zval =

   -6.0462


zval =

   -0.8586


zval =

   -5.8904


zval =

   -0.8613


zval =

   -5.7347


zval =

   -1.9332


zval =

   -5.7347


zval =

    1.9080


zval =

   -5.4233


zval =

    NaN
```

```
zval =

   -4.8003


zval =

   -1.9492


zval =

   -6.0462


zval =

    0.7649


zval =

   -5.2675


zval =

   -1.2284


zval =

   -6.0462


zval =

   -1.6110


zval =

   -6.0462


zval =

   -0.3834


zval =
```

```
       -5.7347


zval =

    1.1160


zval =

   -5.5790


zval =

    0.1233


zval =

   -5.7347


zval =

   -0.6264


zval =

   -6.0462


zval =

   -1.3338


zval =

   -5.8904


zval =

   -2.1681


zval =

   -6.2019


zval =
```

```
        -2.1628


zval =

   -4.9561


zval =

    1.0234


zval =

   -6.0462


zval =

    1.1213


zval =

   -6.0462


zval =

   -2.2842


zval =

   -5.7347


zval =

   -2.2104


zval =

   -6.0462


zval =

   -2.8782
```

```
zval =

   -6.0462


zval =

   -2.4822


zval =

   -6.2019


zval =

    1.2824


zval =

   -5.5790


zval =

   -0.9458


zval =

   -6.2019


zval =

    0.9260


zval =

   -6.2019


zval =

   -2.0836


zval =

   -6.2019
```

```
zval =

   -1.4500


zval =

   -6.0462


zval =

   -2.7990


zval =

   -6.2019


zval =

   -2.5983


zval =

   -4.8003


zval =

    0.5060


zval =

   -4.8003


zval =

   -0.0484


zval =

   -4.9561


zval =

   -2.0257
```

zval =

   -5.4233

zval =

   -1.9385

zval =

   -6.2019

zval =

   -1.2916

zval =

   -6.2019

zval =

   -2.3607

zval =

   -6.0462

zval =

   -0.3438

zval =

   -6.2019

zval =

   -0.7768

zval =

```
                    -5.5790


        zval =

                    -0.3519


        zval =

                    -5.7347


        zval =

                     0.5220


        zval =

                    -6.2019


        zval =

                    -1.3312


        zval =

                    -6.2019


        zval =

                    -2.8755


        zval =

                    -6.2019


        zval =

                    -0.8560


        zval =

                    -6.0462


        zval =
```

```
                    -0.5418

zval =

       -6.2019

zval =

        0.6488

zval =

       -5.8904

zval =

       -2.6037

zval =

       -5.8904

zval =

       -2.3661

zval =

       -5.5790

zval =

       -1.6586

zval =

       -5.5790

zval =

       -0.6291
```

```
zval =

   -5.8904


zval =

   -2.6829


zval =

   -5.2675


zval =

    0.8308


zval =

   -5.8904


zval =

    NaN


zval =

   -5.7347


zval =

   -2.4084


zval =

   -5.1118


zval =

   -1.3895


zval =

   -5.7347
```

```
zval =

   -1.9332


zval =

   -4.3332


zval =

   -1.0068


zval =

   -5.7347


zval =

   -1.8144


zval =

   -5.7347


zval =

    0.7200


zval =

   -4.8003


zval =

    0.9416


zval =

   -5.2675


zval =

   -0.1592
```

```
zval =

   -5.8904

zval =

   -3.1977

zval =

   -5.7347

zval =

   -2.2896

zval =

   -5.8904

zval =

   -1.0593

zval =

   -6.0462

zval =

   -2.9970

zval =

   -6.2019

zval =

   -1.1728

zval =
```

−5.7347

zval =

−0.6660

zval =

−4.6446

zval =

−1.0807

zval =

−5.5790

zval =

−2.2526

zval =

−6.0462

zval =

−2.5614

zval =

−4.9561

zval =

2.4094

zval =

−5.4233

zval =

```
    1.9818

zval =

   -5.5790

zval =

   -0.3915

zval =

   -6.0462

zval =

   -1.4526

zval =

   -5.7347

zval =

   -2.4084

zval =

   -6.0462

zval =

   -2.5614

zval =

   -6.0462

zval =

   -2.7198
```

```
zval =

   -4.4889


zval =

   -0.4101


zval =

   -5.2675


zval =

   -1.3472


zval =

   -6.0462


zval =

   -2.1258


zval =

   -5.7347


zval =

   -1.3392


zval =

   -5.8904


zval =

   -2.0097


zval =

   -6.0462
```

```
zval =

   -0.3834


zval =

   -6.0462


zval =

   -1.3338


zval =

   -5.2675


zval =

   -0.9908


zval =

   -5.7347


zval =

    1.2348


zval =

   -4.4889


zval =

   -0.0934


zval =

   -5.8904


zval =

   -1.4553
```

```
zval =

   -5.8904

zval =

   -2.6433

zval =

   -5.2675

zval =

   -0.3968

zval =

   -6.0462

zval =

   -2.5218

zval =

   -6.0462

zval =

   -1.7694

zval =

   -6.0462

zval =

   -1.1358

zval =
```

```
        -6.0462


zval =

     1.1213


zval =

    -6.0462


zval =

    -2.4030


zval =

    -6.2019


zval =

    -0.1828


zval =

    -5.7347


zval =

     1.1556


zval =

    -5.2675


zval =

    -1.1096


zval =

    -4.4889


zval =
```

```
    0.9758

zval =

   -5.8904

zval =

   -3.1977

zval =

   -4.8003

zval =

   -0.3652

zval =

   -6.2019

zval =

   -2.4795

zval =

   -5.5790

zval =

   -2.0150

zval =

   -5.5790

zval =

   -1.8566
```

```
zval =

   -6.2019


zval =

   -2.1628


zval =

   -6.0462


zval =

   -0.9774


zval =

   -5.1118


zval =

   -1.2707


zval =

   -6.0462


zval =

   -2.0862


zval =

   -5.7347


zval =

   -1.6560


zval =

   -6.2019
```

```
zval =

    0.8864


zval =

   -4.4889


zval =

    0.8966


zval =

   -6.0462


zval =

   -1.4130


zval =

   -5.8904


zval =

    0.2475


zval =

   -5.8904


zval =

   -1.8909


zval =

   -6.0462


zval =

   -1.6110
```

```
zval =

   -5.5790


zval =

    0.1629


zval =

   -4.6446


zval =

   -0.2491


zval =

   -5.2675


zval =

   -1.3868


zval =

   -5.2675


zval =

    1.2664


zval =

   -4.6446


zval =

   -1.9519


zval =
```

```
        -5.7347

zval =

    -0.8640

zval =

    -6.2019

zval =

     0.2132

zval =

    -6.2019

zval =

    -2.4399

zval =

    -5.8904

zval =

    -0.7821

zval =

    -6.0462

zval =

    -1.8090

zval =

    -5.1118

zval =
```

```
            0.5113


zval =

   -5.7347


zval =

    0.9576


zval =

   -5.2675


zval =

   -2.0996


zval =

   -5.8904


zval =

   -0.8613


zval =

   -5.8904


zval =

   -2.2077


zval =

   -5.4233


zval =

   -0.4337
```

```
zval =

   -4.6446


zval =

    0.4637


zval =

   -6.2019


zval =

   -0.8956


zval =

   -5.1118


zval =

    2.2933


zval =

   -5.7347


zval =

    1.1160


zval =

   -4.6446


zval =

   -0.9223


zval =

   -6.0462
```

```
zval =

    -1.7694

zval =

    -5.4233

zval =

    -0.7901

zval =

    -6.0462

zval =

    -1.4526

zval =

    -6.2019

zval =

    -0.6184

zval =

    -5.8904

zval =

     0.9999

zval =

    -5.8904

zval =

    -1.6929
```

```
zval =

   -6.2019


zval =

   -1.2124


zval =

   -4.9561


zval =

   -2.3821


zval =

   -5.8904


zval =

   -1.9701


zval =

   -4.4889


zval =

    0.2630


zval =

   -5.7347


zval =

   -1.6956


zval =
```

```
        -6.0462


zval =

    -1.7298


zval =

    -4.1774


zval =

     1.8813


zval =

    -4.3332


zval =

    -0.3732


zval =

    -6.0462


zval =

    -0.2250


zval =

    -5.7347


zval =

     1.6704


zval =

    -6.0462


zval =
```

```
     -1.2546


zval =

   -5.7347


zval =

   -1.4580


zval =

   -6.2019


zval =

    0.9656


zval =

   -6.0462


zval =

   -0.9774


zval =

   -5.8904


zval =

   -2.4057


zval =

   -4.8003


zval =

    1.9316
```

```
zval =

   -4.6446


zval =

   -0.6451


zval =

   -5.4233


zval =

   -0.6317


zval =

   -6.0462


zval =

   -2.3634


zval =

   -5.4233


zval =

   -2.0177


zval =

   -5.1118


zval =

    2.6101


zval =

   -5.4233
```

```
zval =

   -2.3741


zval =

   -6.2019


zval =

    0.3320


zval =

   -6.2019


zval =

   -1.9648


zval =

   -5.4233


zval =

   -1.5821


zval =

   -5.7347


zval =

   -2.4480


zval =

   -6.0462


zval =

    1.5965
```

```
zval =

   -5.7347


zval =

   -0.1116


zval =

   -5.8904


zval =

   -0.8217


zval =

   -6.2019


zval =

   -0.7768


zval =

   -4.8003


zval =

    1.2980


zval =

   -6.0462


zval =

    1.4381


zval =
```

```
                -4.3332


        zval =

                -0.6900


        zval =

                -6.0462


        zval =

                -2.6406


        zval =

                -5.5790


        zval =

                -1.6586


        zval =

                -6.0462


        zval =

                -1.7298


        zval =

                -4.4889


        zval =

                 1.1738


        zval =

                -6.0462


        zval =
```

```
                    -0.1458

    zval =

                    -6.2019

    zval =

                    -0.6976

    zval =

                    -5.8904

    zval =

                    -1.9701

    zval =

                    -6.0462

    zval =

                    -2.0862

    zval =

                    -5.5790

    zval =

                    -2.2922

    zval =

                    -6.2019

    zval =

                    -2.2023
```

```
zval =

   -6.0462


zval =

   -2.6010


zval =

   -4.8003


zval =

    1.6940


zval =

   -6.0462


zval =

   -2.1258


zval =

   -6.2019


zval =

   -0.6580


zval =

   -5.4233


zval =

   -1.1465


zval =

   -5.8904
```

```
zval =

   -1.5345


zval =

    NaN


zval =

    NaN


zval =

   -5.7347


zval =

    0.1260


zval =

   -6.2019


zval =

   -1.4104


zval =

   -5.7347


zval =

    NaN


zval =

   -5.8904


zval =

   -1.7325
```

```
zval =

   -4.1774


zval =

    1.5645


zval =

   -6.0462


zval =

   -2.9178


zval =

   -6.0462


zval =

   -3.2346


zval =

   -6.2019


zval =

   -2.1628


zval =

   -6.2019


zval =

   -1.4896


zval =
```

```
                -4.9561

zval =

    2.0134

zval =

   -6.0462

zval =

   -2.2050

zval =

   -5.5790

zval =

   -0.4707

zval =

   -6.0462

zval =

   -2.2050

zval =

   -6.2019

zval =

   -2.7963

zval =

   -5.8904

zval =
```

```
-0.9405
```

```
zval =

   -5.4233
```

```
zval =

   -0.5525
```

```
zval =

   -5.8904
```

```
zval =

   -2.2473
```

```
zval =

   -5.7347
```

```
zval =

    1.0368
```

```
zval =

   -6.0462
```

```
zval =

    1.8341
```

```
zval =

   -5.7347
```

```
zval =

   -1.1412
```

```
zval =

    -5.8904


zval =

    -2.6037


zval =

    -4.9561


zval =

     1.1422


zval =

    -6.0462


zval =

    -1.5318


zval =

    -6.0462


zval =

    -1.8486


zval =

    -5.5790


zval =

    -0.5499


zval =

    -6.0462
```

```
zval =

   -1.1358


zval =

   -6.0462


zval =

   -1.7298


zval =

   -5.8904


zval =

   -1.0197


zval =

   -4.9561


zval =

    1.6570


zval =

   -5.1118


zval =

    2.1745


zval =

   -6.0462


zval =

   -2.2446
```

```
zval =

   -4.6446

zval =

    0.4637

zval =

   -5.2675

zval =

   -1.6244

zval =

   -5.2675

zval =

   -0.9512

zval =

   -5.4233

zval =

    0.0811

zval =

   -5.2675

zval =

    0.0388

zval =
```

```
        -5.7347


zval =

   -1.5372


zval =

   -6.2019


zval =

   -1.0144


zval =

   -6.2019


zval =

   -0.8560


zval =

   -5.4233


zval =

    0.8335


zval =

   -5.7347


zval =

   -1.2996


zval =

   -4.9561


zval =
```

```
    2.2114


zval =

   -5.8904


zval =

   -1.0989


zval =

   -6.0462


zval =

    0.6065


zval =

   -6.0462


zval =

   -0.3438


zval =

   -5.8904


zval =

   -1.8909


zval =

   -5.8904


zval =

   -2.0889
```

```
zval =

   -5.7347


zval =

   -1.4976


zval =

   -4.3332


zval =

    NaN


zval =

   -5.8904


zval =

   -1.9305


zval =

   -5.5790


zval =

    0.5193


zval =

   -5.2675


zval =

   -0.3176


zval =

   -4.6446
```

```
zval =

   0.3053


zval =

  -5.8904


zval =

  -1.0593


zval =

  -5.8904


zval =

  -1.3761


zval =

  -6.0462


zval =

  -1.4922


zval =

  -5.1118


zval =

  -0.5975


zval =

   NaN


zval =

   NaN
```

```
zval =

    -6.0462


zval =

    -0.8982


zval =

    -6.0462


zval =

    -2.9178


zval =

    -5.5790


zval =

     NaN


zval =

    -5.1118


zval =

     0.8281


zval =

    -6.0462


zval =

    -2.4426


zval =
```

```
                    -6.0462


        zval =

          -2.0862


        zval =

          -4.3332


        zval =

           1.2108


        zval =

          -5.5790


        zval =

          -1.2230


        zval =

          -5.8904


        zval =

          -2.1681


        zval =

          -5.8904


        zval =

          -2.5641


        zval =

          -4.6446


        zval =
```

```
                         1.2161


             zval =

                      -5.7347


             zval =

                      -3.3191


             zval =

                      -5.5790


             zval =

                      -0.9458


             zval =

                      -5.7347


             zval =

                      -1.8144


             zval =

                      -5.7347


             zval =

                      -2.5668


             zval =

                      -5.5790


             zval =

                       0.5193
```

```
zval =

   -5.2675


zval =

   -1.1888


zval =

   -5.2675


zval =

   -0.8720


zval =

   -6.2019


zval =

   -1.2916


zval =

   -6.0462


zval =

   -0.3834


zval =

   -6.0462


zval =

   -2.8386


zval =

   -5.5790
```

```
zval =

    1.9053


zval =

   -5.5790


zval =

    NaN


zval =

   -5.1118


zval =

   -1.0331


zval =

   -4.9561


zval =

   -0.0457


zval =

   -6.0462


zval =

   -3.2346


zval =

   -6.2019


zval =

   -0.7768
```

```
zval =

   -4.8003

zval =

   -0.3652

zval =

   -5.5790

zval =

    0.2817

zval =

   -6.0462

zval =

   -0.6606

zval =

   -4.8003

zval =

    0.9416

zval =

   -6.0462

zval =

   -2.3634

zval =
```

```
               -6.0462


zval =

      -1.8090


zval =

      -4.3332


zval =

       1.6464


zval =

      -6.0462


zval =

      -2.2050


zval =

      -5.4233


zval =

       0.2791


zval =

      -5.8904


zval =

      -1.4553


zval =

      -5.8904


zval =
```

```
             -1.9701


zval =

   -6.0462


zval =

   -1.7298


zval =

   -6.0462


zval =

   -1.2942


zval =

   -5.1118


zval =

    2.2933


zval =

   -5.7347


zval =

   -0.6264


zval =

   -5.1118


zval =

    1.9765
```

```
zval =

   -5.2675


zval =

   -2.0996


zval =

   -5.8904


zval =

   -1.7325


zval =

   -5.7347


zval =

    1.8288


zval =

   -6.2019


zval =

   -2.4399


zval =

   -5.5790


zval =

   -1.6586


zval =

   -6.2019
```

```
zval =

   -0.7768


zval =

   -6.0462


zval =

   -2.2050


zval =

   -6.2019


zval =

   -2.2419


zval =

   -6.0462


zval =

    0.5669


zval =

   -6.2019


zval =

    0.9260


zval =

   -5.8904


zval =

   -1.0593
```

```
zval =

   -6.0462


zval =

   -2.4822


zval =

   -5.7347


zval =

   -0.9828


zval =

   -5.2675


zval =

    0.8308


zval =

   -5.8904


zval =

   -3.6729


zval =

   -6.2019


zval =

    0.8072


zval =
```

```
    NaN

zval =

   NaN

zval =

   -4.9561

zval =

   -1.5901

zval =

   -4.3332

zval =

   -0.8484

zval =

   -4.8003

zval =

    1.2188

zval =

   -6.2019

zval =

    1.6388

zval =

   -6.2019

zval =
```

1.2428

zval =

  -5.4233

zval =

  0.0811

zval =

  -5.1118

zval =

  1.5409

zval =

  -5.8904

zval =

  1.9107

zval =

  -5.8904

zval =

  -0.2673

zval =

  -4.9561

zval =

  0.0335

```
zval =

   -5.7347


zval =

    0.5220


zval =

   -5.7347


zval =

   -0.5868


zval =

   -5.8904


zval =

   -1.9305


zval =

   -6.0462


zval =

    0.4481


zval =

   -5.5790


zval =

   -1.8170


zval =

   -5.8904
```

```
zval =

   -1.0593


zval =

   -5.5790


zval =

   -2.2130


zval =

   -6.2019


zval =

   -0.2224


zval =

   -5.2675


zval =

    0.4348


zval =

   -5.7347


zval =

   -1.3392


zval =

   -6.0462


zval =

   -1.8090
```

```
zval =

   -5.2675


zval =

   -0.7136


zval =

   -5.4233


zval =

   -1.2653


zval =

   -5.1118


zval =

    2.5705


zval =

   -5.5790


zval =

    1.7073


zval =

   -6.2019


zval =

   -2.4399


zval =
```

```
                 -5.1118


zval =

     -0.2015


zval =

     -6.0462


zval =

     -1.6506


zval =

     -5.1118


zval =

      0.3133


zval =

     -4.8003


zval =

     -2.5432


zval =

     -5.8904


zval =

      0.3267


zval =

     -5.8904


zval =
```

```
        -2.1285

zval =

    -4.3332

zval =

     1.2108

zval =

    -6.2019

zval =

    -1.5688

zval =

    -4.9561

zval =

    -0.9961

zval =

    -4.8003

zval =

     0.0704

zval =

    -6.2019

zval =

    -0.7372
```

```
zval =

   -4.0217


zval =

   -0.0618


zval =

   -4.0217


zval =

    2.9082


zval =

   -6.2019


zval =

   -3.2715


zval =

   -6.0462


zval =

   -0.7794


zval =

   -6.2019


zval =

   -1.4896


zval =

   -5.4233
```

```
zval =

    0.7147


zval =

   -6.0462


zval =

   -0.9774


zval =

   -5.8904


zval =

   -1.4553


zval =

   -6.0462


zval =

   -0.5022


zval =

   -5.8904


zval =

   -0.3069


zval =

   -5.1118


zval =

   -0.0035
```

```
zval =

   -6.2019


zval =

   -2.0044


zval =

   -6.0462


zval =

   -1.3734


zval =

   -4.9561


zval =

    1.1818
```

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