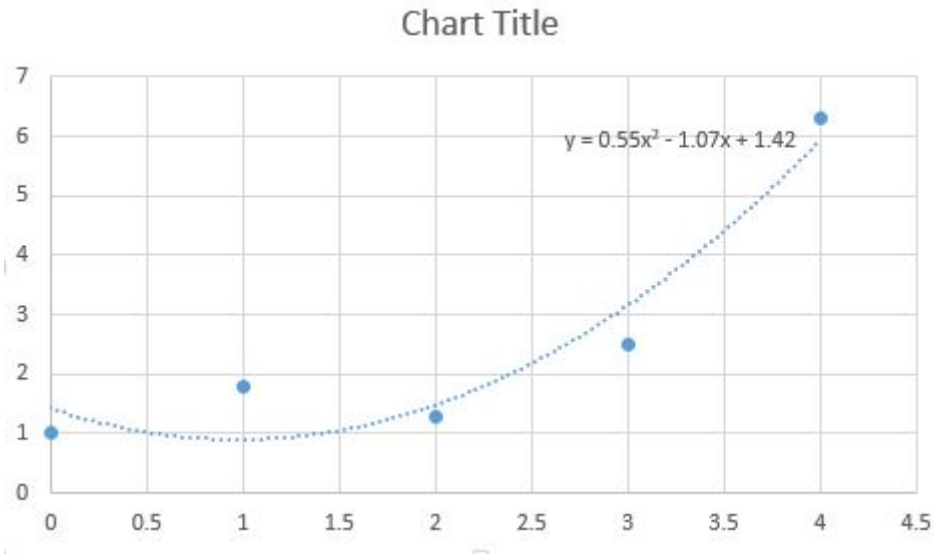
UPDATE: For a better and cleaner version of the program I refer you to this link.

```
//Polynomial Fit
#include<iostream>
#include<iomanip>
#include<cmath>
using namespace std;
int main()
{
    int i,j,k,n,N;
    cout.precision(4);                          //set precision
    cout.setf(ios::fixed);
    cout<<"\nEnter the no. of data pairs to be entered:\n";        //To find the size
of arrays that will store x,y, and z values
    cin>>N;
    double x[N],y[N];
    cout<<"\nEnter the x-axis values:\n";               //Input x-values
    for (i=0;i<N;i++)
        cin>>x[i];
    cout<<"\nEnter the y-axis values:\n";               //Input y-values
    for (i=0;i<N;i++)
        cin>>y[i];
    cout<<"\nWhat degree of Polynomial do you want to use for the fit?\n";
    cin>>n;                                  // n is the degree of Polynomial
    double X[2*n+1];                          //Array that will store the values of
sigma(xi),sigma(xi^2),sigma(xi^3)....sigma(xi^2n)
    for (i=0;i<2*n+1;i++)
    {
        X[i]=0;
        for (j=0;j<N;j++)
            X[i]=X[i]+pow(x[j],i);        //consecutive positions of the array will
store N,sigma(xi),sigma(xi^2),sigma(xi^3)....sigma(xi^2n)
    }
    double B[n+1][n+2],a[n+1];            //B is the Normal matrix(augmented) that will
store the equations, 'a' is for value of the final coefficients
    for (i=0;i<=n;i++)
        for (j=0;j<=n;j++)
            B[i][j]=X[i+j];            //Build the Normal matrix by storing the
corresponding coefficients at the right positions except the last column of the matrix
    double Y[n+1];                     //Array to store the values of
sigma(yi),sigma(xi*yi),sigma(xi^2*yi)...sigma(xi^n*yi)
    for (i=0;i<n+1;i++)
    {
        Y[i]=0;
        for (j=0;j<N;j++)
        Y[i]=Y[i]+pow(x[j],i)*y[j];        //consecutive positions will store
sigma(yi),sigma(xi*yi),sigma(xi^2*yi)...sigma(xi^n*yi)
    }
    for (i=0;i<=n;i++)
        B[i][n+1]=Y[i];                //load the values of Y as the last column of
B(Normal Matrix but augmented)
```

```
    n=n+1;                //n is made n+1 because the Gaussian Elimination part below
was for n equations, but here n is the degree of polynomial and for n degree we get n+1
equations
    cout<<"\nThe Normal(Augmented Matrix) is as follows:\n";
    for (i=0;i<n;i++)            //print the Normal-augmented matrix
    {
        for (j=0;j<=n;j++)
            cout<<B[i][j]<<setw(16);
        cout<<"\n";
    }
    for (i=0;i<n;i++)                    //From now Gaussian Elimination starts(can be
ignored) to solve the set of linear equations (Pivotisation)
        for (k=i+1;k<n;k++)
            if (B[i][i]<B[k][i])
                for (j=0;j<=n;j++)
                {
                    double temp=B[i][j];
                    B[i][j]=B[k][j];
                    B[k][j]=temp;
                }
    for (i=0;i<n-1;i++)            //loop to perform the gauss elimination
        for (k=i+1;k<n;k++)
            {
                double t=B[k][i]/B[i][i];
                for (j=0;j<=n;j++)
                    B[k][j]=B[k][j]-t*B[i][j];    //make the elements below the pivot
elements equal to zero or elimnate the variables
            }
    for (i=n-1;i>=0;i--)                //back-substitution
    {                        //x is an array whose values correspond to the values of
x,y,z..
        a[i]=B[i][n];                //make the variable to be calculated equal to the
rhs of the last equation
        for (j=0;j<n;j++)
            if (j!=i)            //then subtract all the lhs values except the
coefficient of the variable whose value                                    is being
calculated
                a[i]=a[i]-B[i][j]*a[j];
        a[i]=a[i]/B[i][i];            //now finally divide the rhs by the coefficient
of the variable to be calculated
    }
    cout<<"\nThe values of the coefficients are as follows:\n";
    for (i=0;i<n;i++)
        cout<<"x^"<<i<<"="<<a[i]<<endl;            // Print the values of
x^0,x^1,x^2,x^3,....
    cout<<"\nHence the fitted Polynomial is given by:\ny=";
    for (i=0;i<n;i++)
        cout<<" + ("<<a[i]<<")"<<"x^"<<i;
    cout<<"\n";
    return 0;
}//output attached as .jpg
```



Verification using Excel

```
Enter the no. of data pairs to be entered:
5

Enter the x-axis values:
0
1
2
3
4

Enter the y-axis values:
1
1.8
1.3
2.5
6.3

What degree of Polynomial do you want to use for the fit?
2

The Normal(Augmented Matrix) is as follows:
5.0000          10.0000          30.0000          12.9000
10.0000          30.0000          100.0000          37.1000
30.0000          100.0000          354.0000          130.3000

The values of the coefficients are as follows:
x^0=1.4200
x^1=-1.0700
x^2=0.5500

Hence the fitted Polynomial is given by:
y= + (1.4200)x^0 + (-1.0700)x^1 + (0.5500)x^2
```

Sample Output

Explanation of the code:

So that's it! That's how you perform a polynomial fit to a given set of data.

I have also ported my code to JAVA so that it works in my Android App.

So if you want you can check out those posts too.

Hope you guys find it useful!
If you have any questions/doubts, hit me up in the comments section below.

You can refer to the following links for more info:
Linear Fitting – Lab Write-Up
Linear Fitting – C++ Program
Linear Fitting – Scilab Code
Curve Fit Tools – Android App (using the above code)
Curve Fit Tools – Documentation
Curve Fit Tools – Play Store
Curve Fit Tools – GitHub Repository
Curve Fitters – Scilab Toolbox

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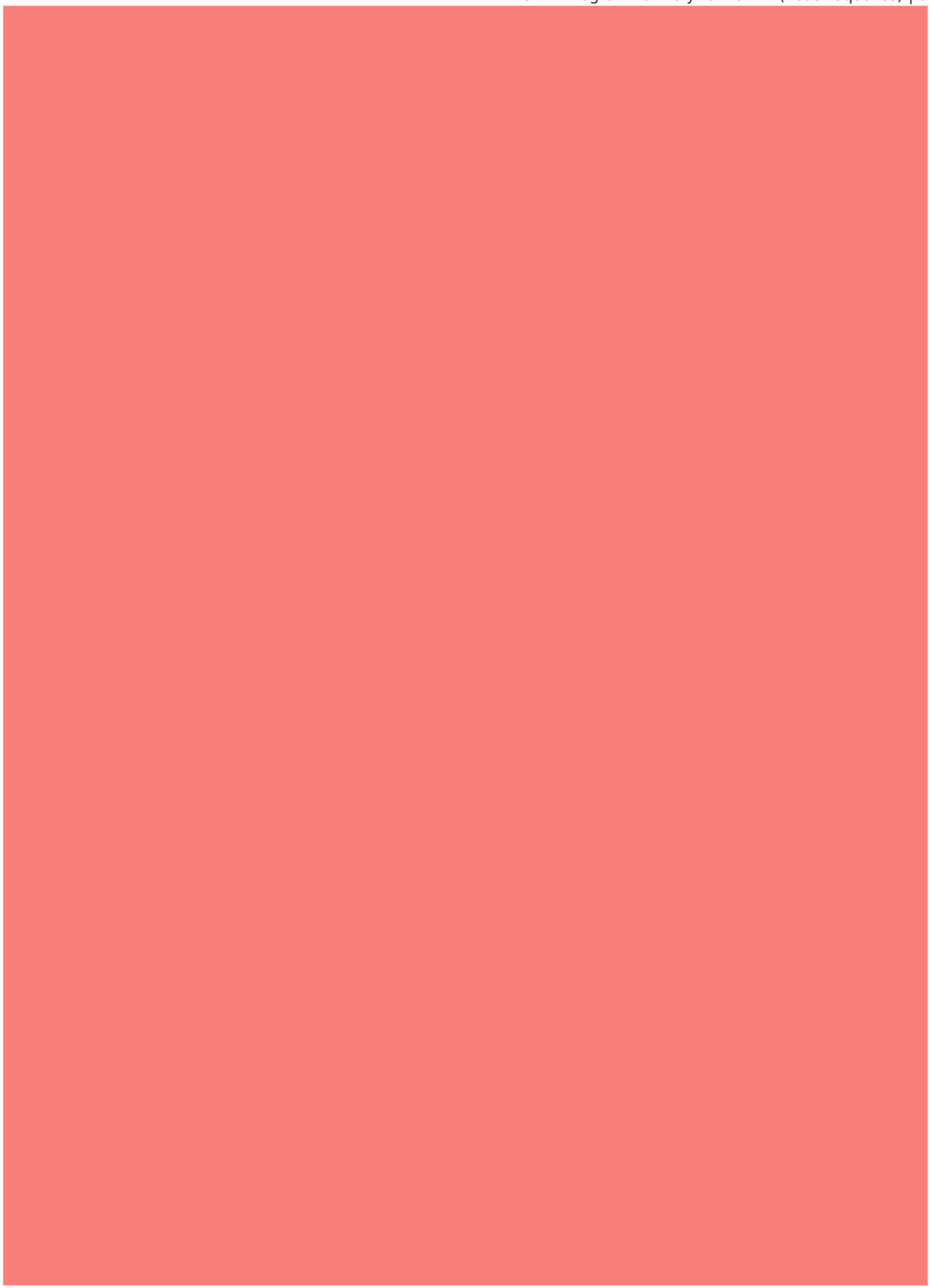

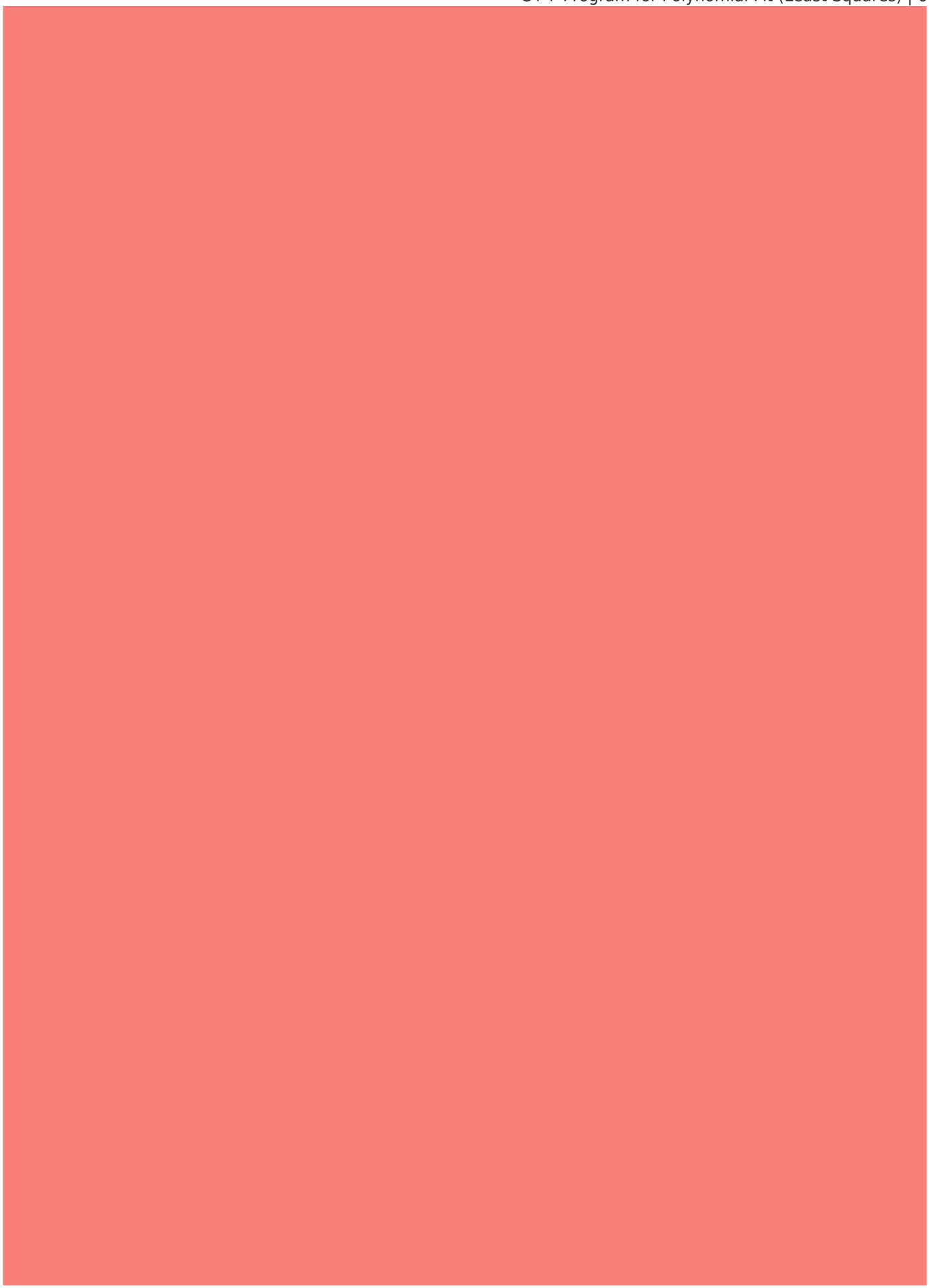

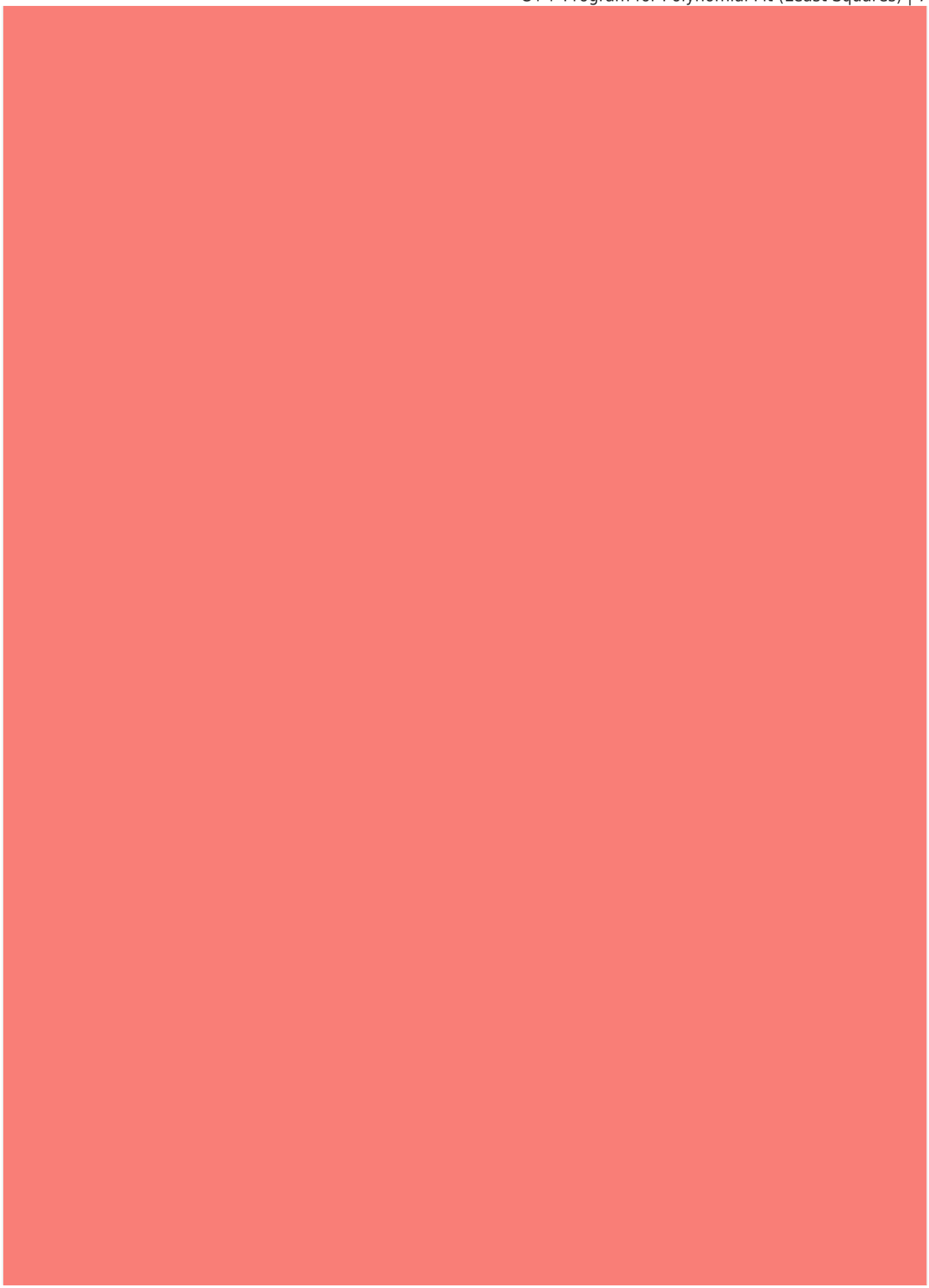

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