## Contents
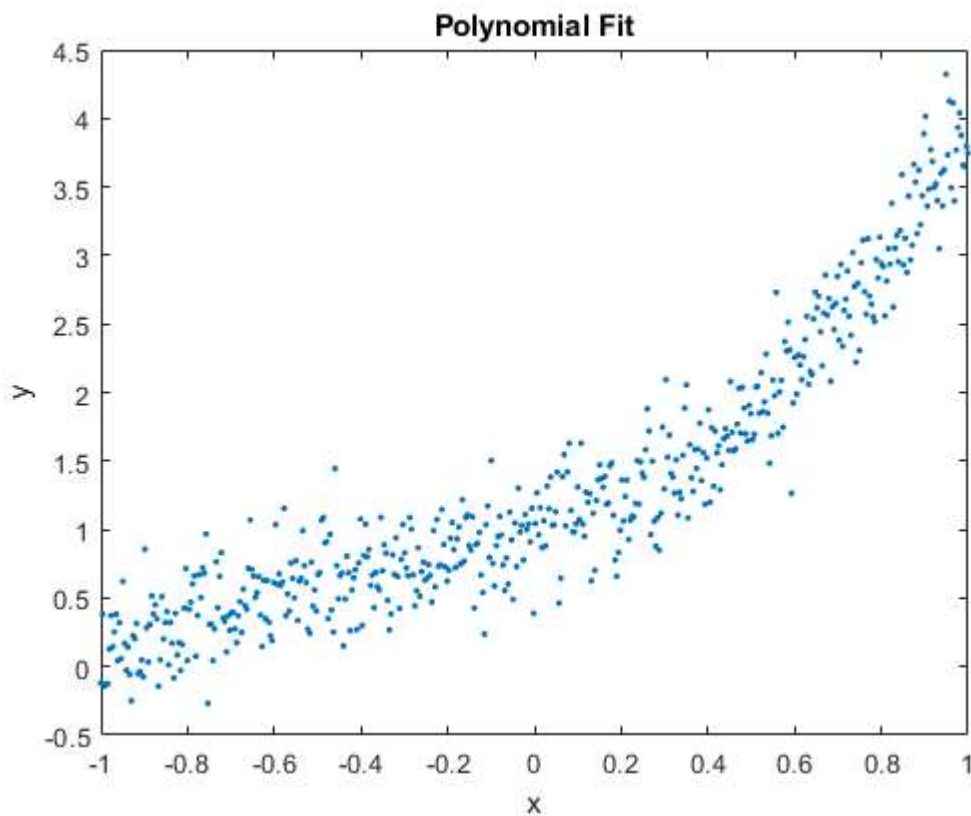
```
% Poly Fit
% HW 4 Pb 1d

clear
clc
close all
```

## Plot of noisy data

```
load('test_lsq.mat')

figure, plot(x,ynoisy,'.','MarkerSize',7)
xlabel('x'), ylabel('y'), title('Polynomial Fit')
hold on
```



## Linear Fit

Order of Poly Being Fitted

```
n = 1;

% Set up the Jacobian for an elimination fit to a line
J = cat(2,ones(length(x),1));
for i =  1 : n
    xi = x(:).^i;
    J = cat(2,J,xi);
end % for

M=J'*J;
yprime=J'*ynoisy(:);
[Mmod,ord]=Gauss_elim(M,yprime);
avec=backsub(Mmod(ord,:))

yfit = 0;
for i = 1 : n+1
    yfit = yfit + avec(i)*x.^(i-1);
end % for

KiSq1 = KiSq(ynoisy,yfit,sigmay,n)

plot(x,yfit,'--','LineWidth',4);
```
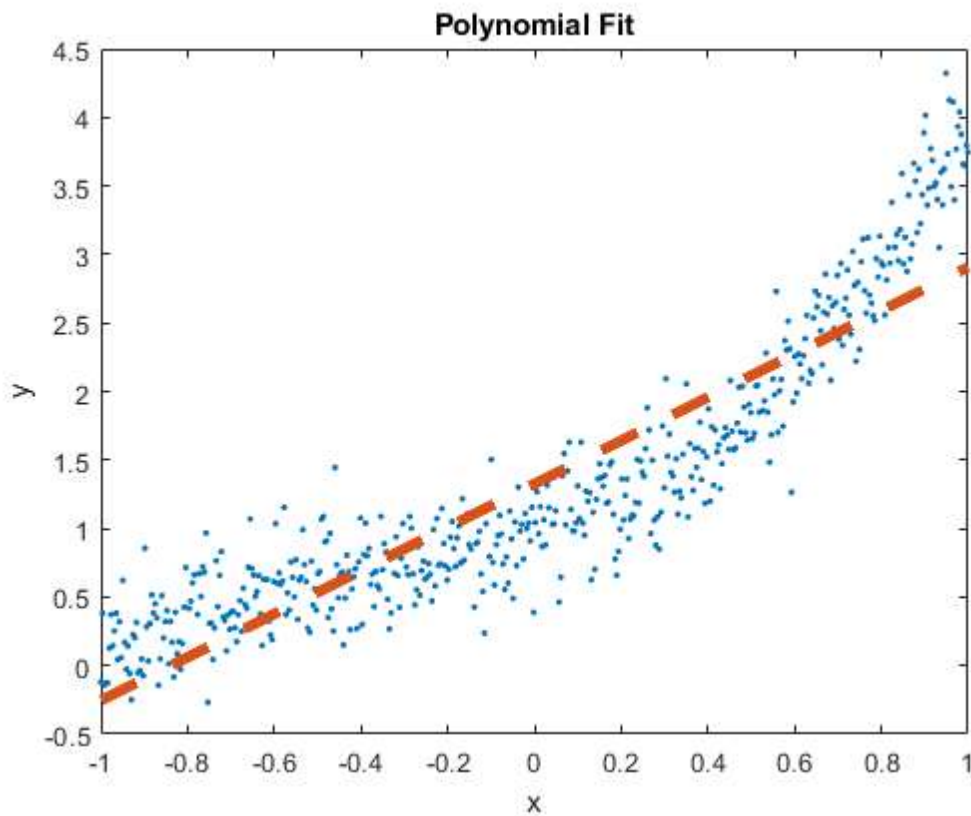
avec =

    1.3247
    1.5812


KiSq1 =

    2.9125

Polynomial Fit

## Quadratic Fit

Order of Poly Being Fitted

```
n = 2;

% Set up the Jacobian for an elimination fit to a line
J = cat(2,ones(length(x),1));
for i =  1 : n
    xi = x(:).^i;
    J = cat(2,J,xi);
end % for

M=J'*J;
yprime=J'*ynoisy(:);
[Mmod,ord]=Gauss_elim(M,yprime);
avec=backsub(Mmod(ord,:))

yfit2 = 0;
for i = 1 : n+1
    yfit2 = yfit2 + avec(i)*x.^(i-1);
end % for

KiSq2 = KiSq(ynoisy,yfit2,sigmay,n)

plot(x,yfit2,'--','LineWidth',4);
```
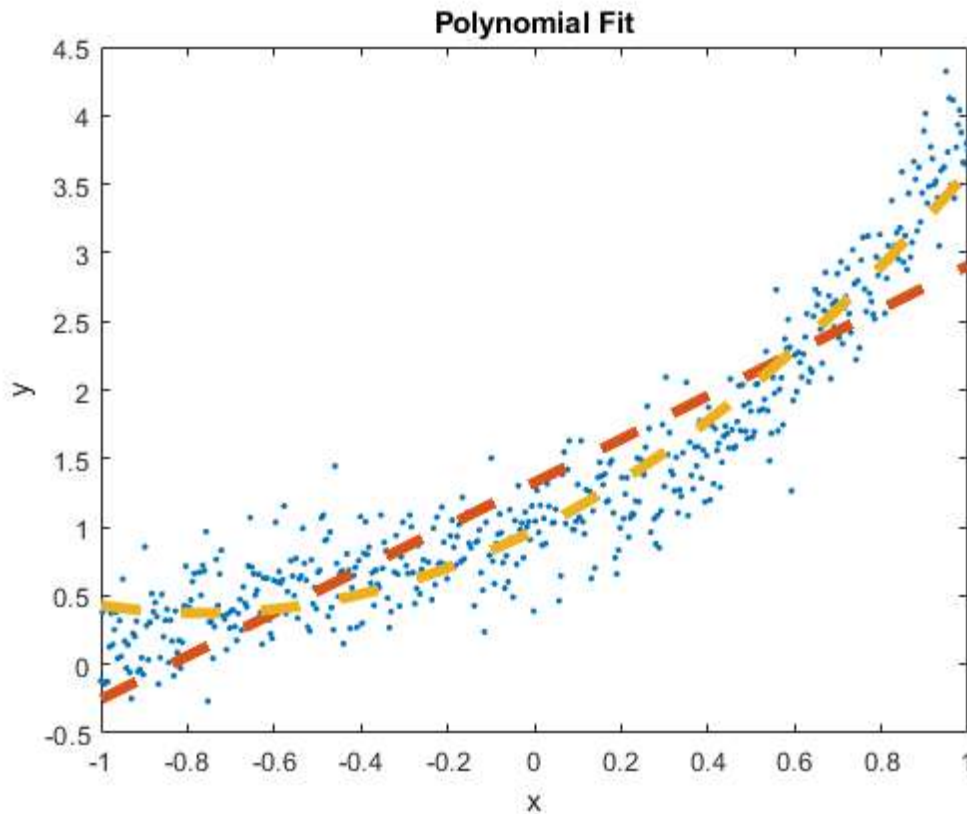
```
avec =

    0.9785
    1.5812
```

```
    1.0344


KiSq2 =

    1.3754
```

### Polynomial Fit



## Cubic Fit

Order of Poly Being Fitted

```
n = 3;

% Set up the Jacobian for an elimination fit to a line
J = cat(2,ones(length(x),1));
for i =  1 : n
    xi = x(:).^i;
    J = cat(2,J,xi);
end % for

M=J'*J;
yprime=J'*ynoisy(:);
[Mmod,ord]=Gauss_elim(M,yprime);
avec=backsub(Mmod(ord,:))

yfit3 = 0;
for i = 1 : n+1
    yfit3 = yfit3 + avec(i)*x.^(i-1);
end % for

KiSq3 = KiSq(ynoisy,yfit3,sigmay,n)
```

```
plot(x,yfit3,'--','LineWidth',4);

legend('Data Set','Linear Fit','Quadratic Fit','Cubic Fit');
hold off

figure, plot(x,polyval(avec,x)-ynoisy)
figure, hist(polyval(avec,x)-ynoisy,512)
```

avec =

    0.9785
    0.9980
    1.0344
    0.9682


KiSq3 =

    1.0285

Polynomial Fit