

```

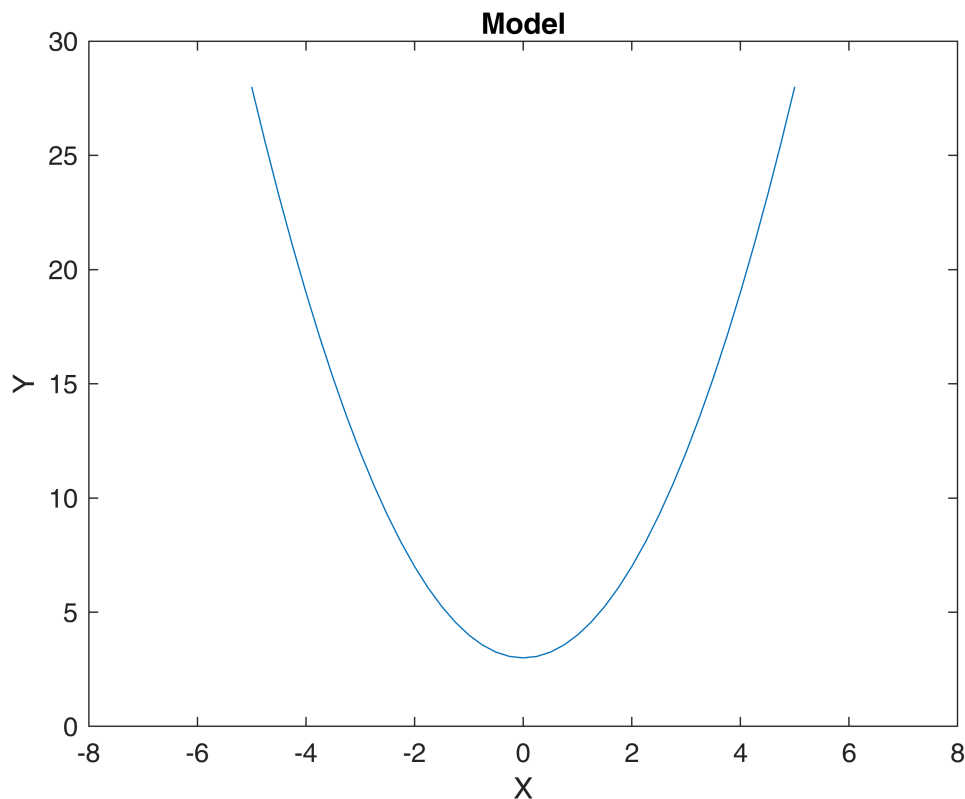
clear all, clc,

x_train = -5:0.25:5;
x_test  = -5.1:0.25:4.9;

y_train = x_train.^2+3;
y_test  = x_test.^2+3;

figure,
plot(x_train,y_train); xlim([-8,8]);
title('Model');
xlabel('X'), ylabel('Y');

```



```

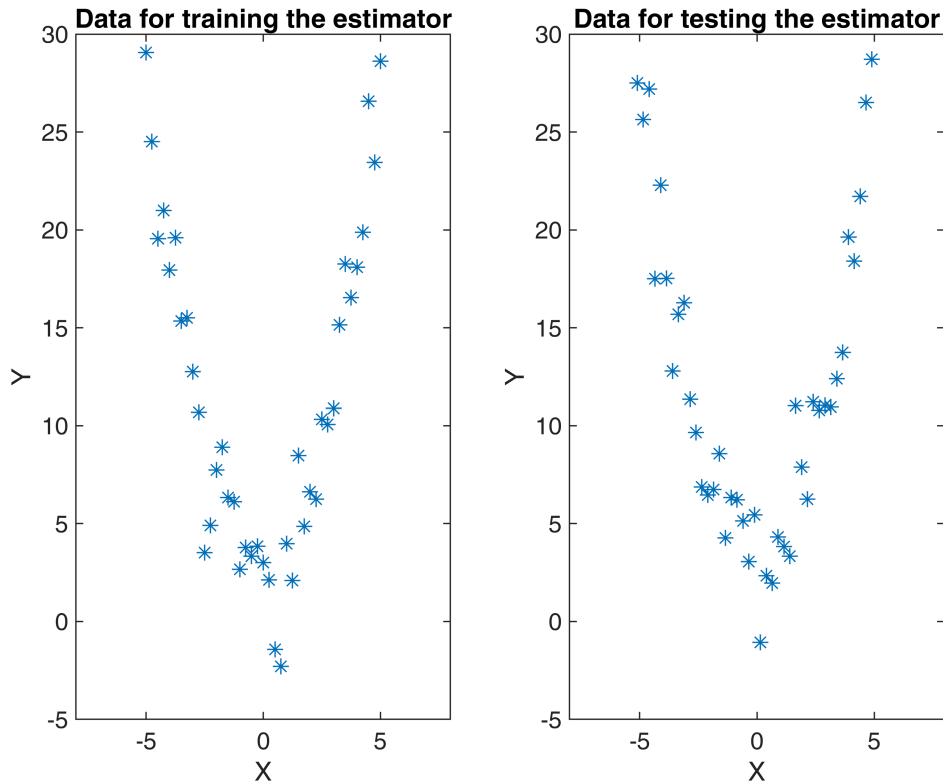
y_train = y_train + 2*randn(1,length(y_train));
y_test  = y_test  + 2*randn(1,length(y_test));

figure;
subplot(1,2,1)
plot(x_train,y_train, '*'); xlim([-8,8]);
title('Data for training the estimator');
xlabel('X'), ylabel('Y');

subplot(1,2,2)
plot(x_test,y_test, '*'); xlim([-8,8]);
title('Data for testing the estimator');

```

```
xlabel('X'), ylabel('Y');
```



```
% Train and test of several estimators
```

```
degree = [1 2 3 10 15 20 22];
```

```
for i = 1:length(degree)
```

```
    N = degree(i);
```

```
    P = polyfit(x_train,y_train,N);
```

```
    y_N = polyval(P,x_train);
```

```
    figure,
```

```
    plot(x_train,y_train, '*'), xlim([-10,10]),  
    title(strcat('Degree:', '{' '}', num2str(N)) );
```

```
    xlabel('X'), ylabel('Y');
```

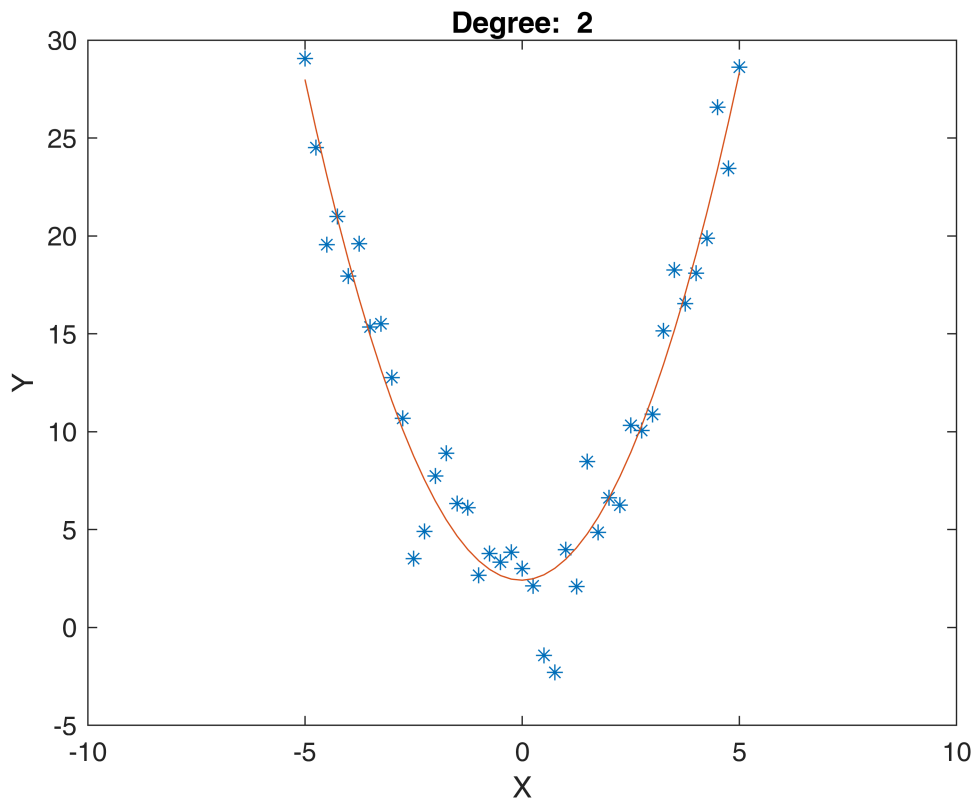
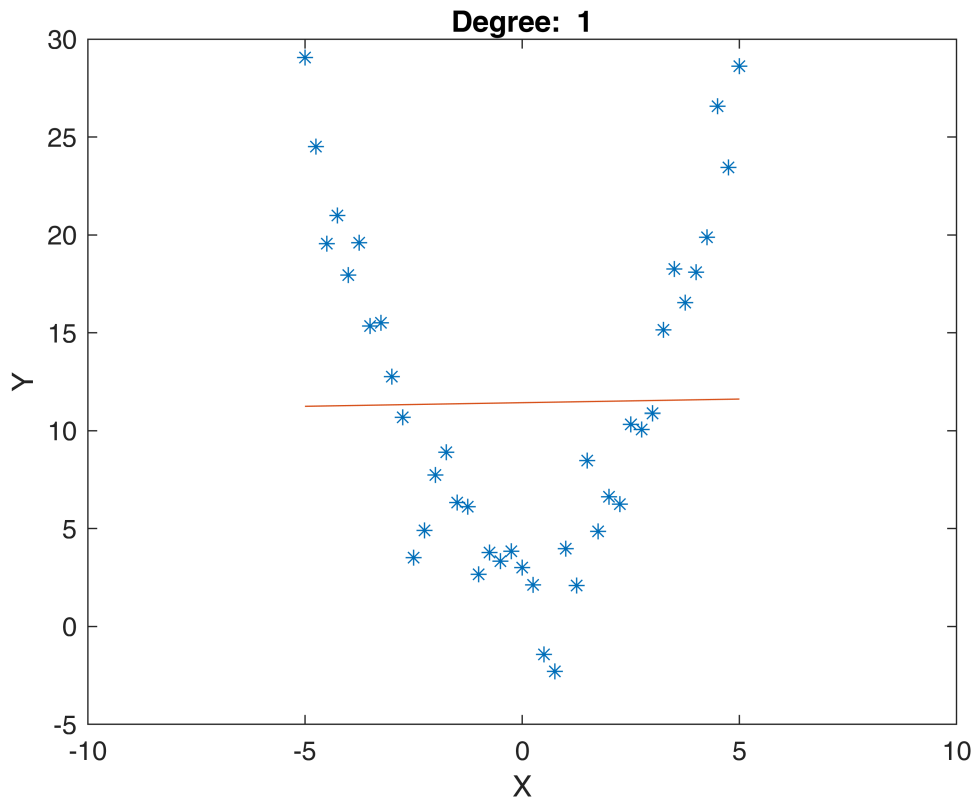
```
    hold on;
```

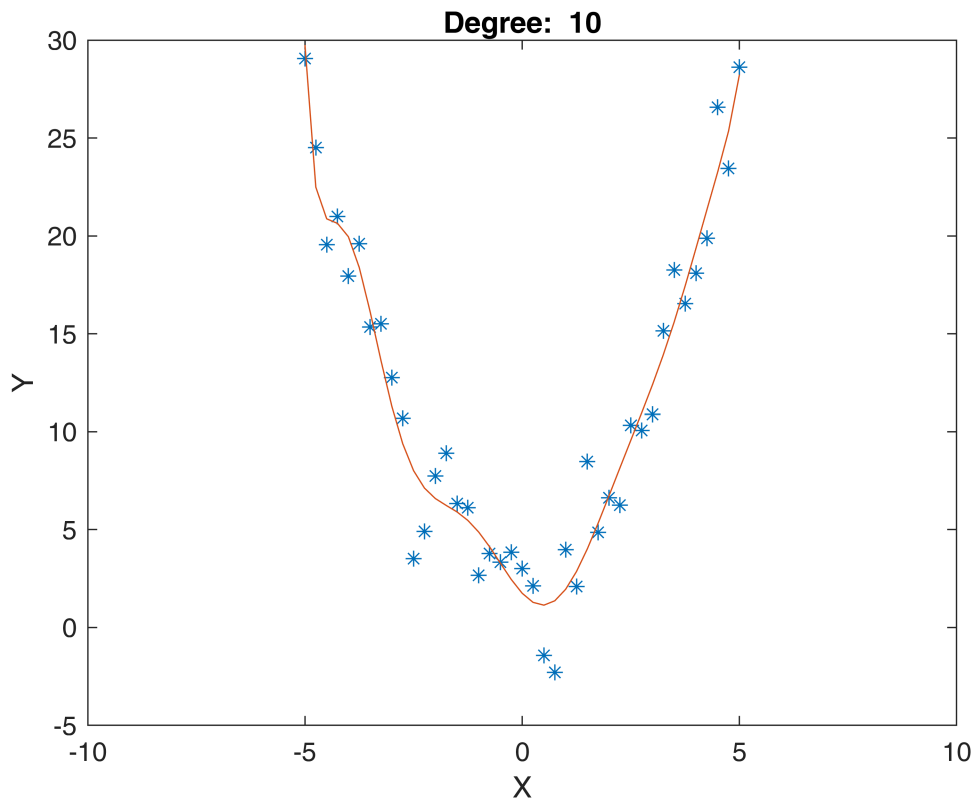
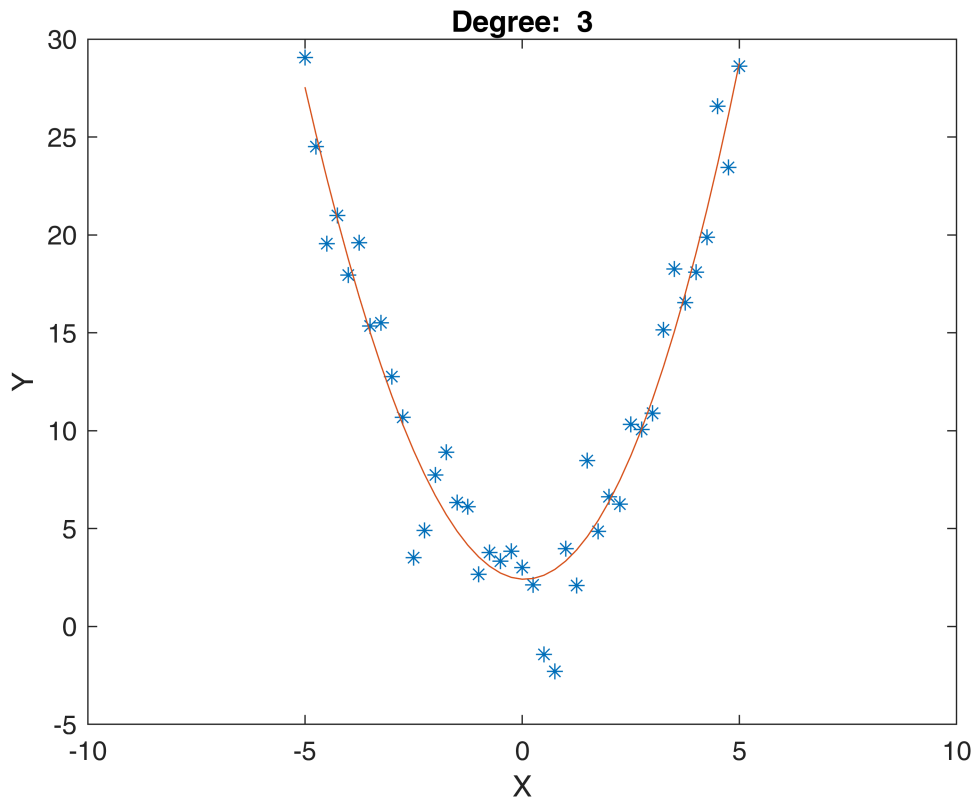
```
    plot(x_train,y_N);
```

```
    err_train(i) = rms( polyval(P,x_train) - y_train );
```

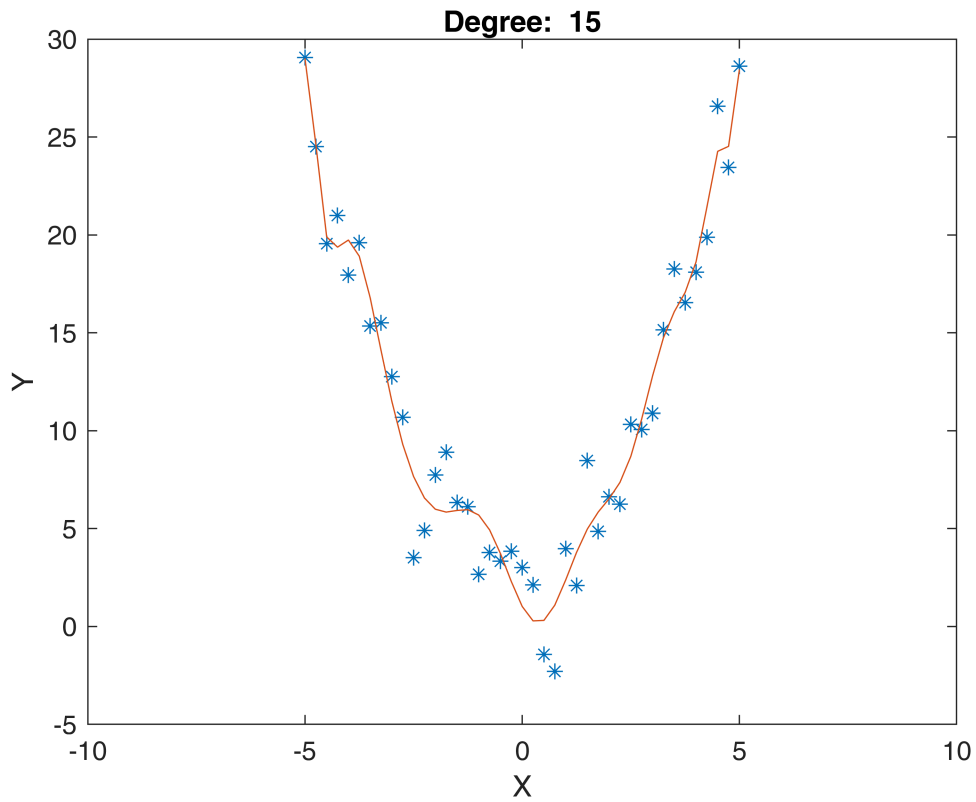
```
    err_test(i) = rms( polyval(P,x_test) - y_test );
```

```
end
```

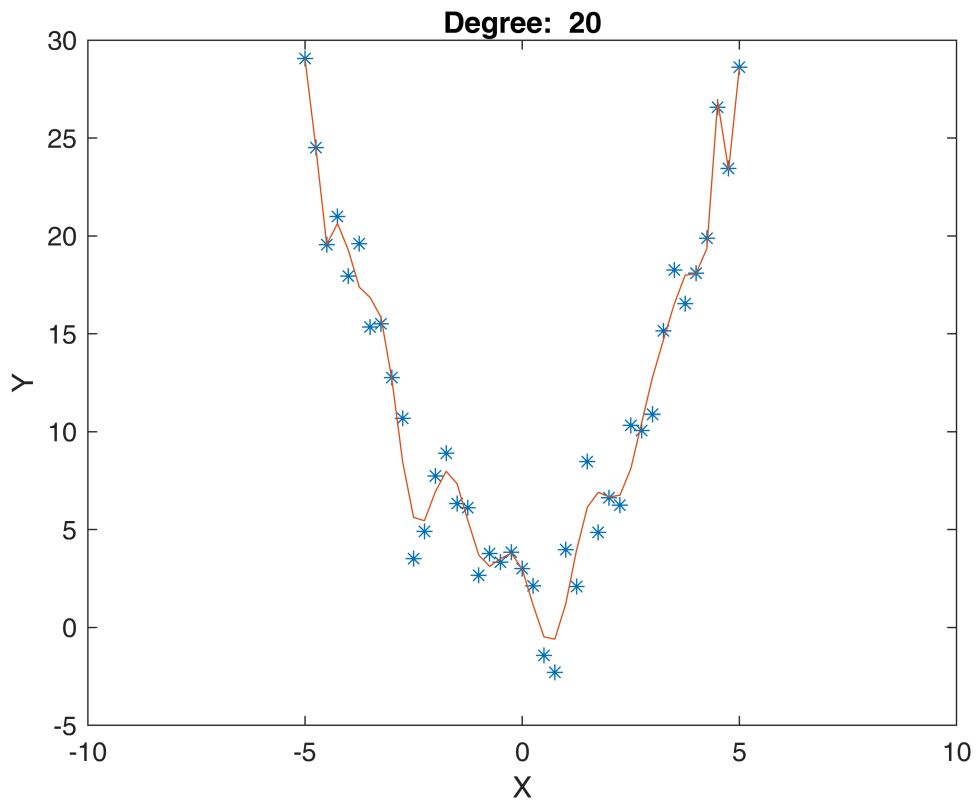




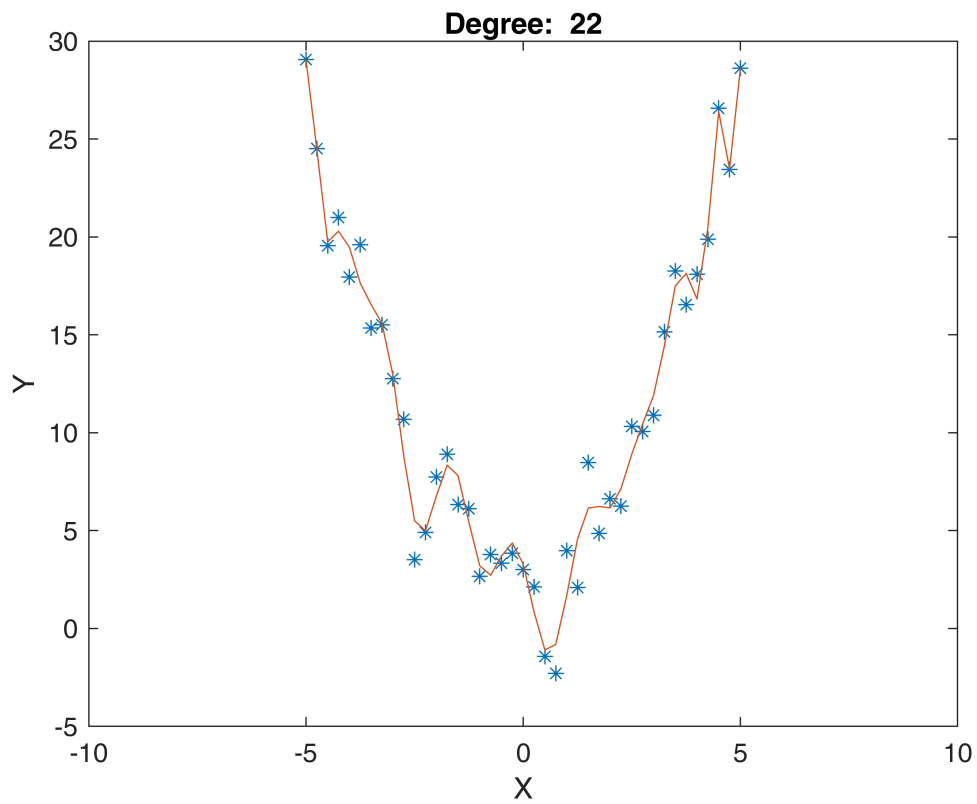
Warning: Polynomial is badly conditioned. Add points with distinct X values, reduce the degree of the polynomial, or try centering and scaling as described in HELP POLYFIT.



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```
figure;  
plot(1:length(degree),err_train,'-*');  
hold on  
plot(1:length(degree),err_test,'-*');  
  
xticklabels({'1','2','3','10','15','20','25'});  
xlabel('Degree'), ylabel('RMSE');  
  
legend('Train','Test');
```

