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# ECE 498 - Matlab

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```
clear;  
clc;  
close all;
```

## Question 1: Curve Fitting

```
enrollment = [  
% Year  
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008  
2009 2010 2011 2012 2013 2014 2015      2016  
% UM  
9996 9928 9213 9451 9945 10282 10698 11135 11222 11358 11435 11797  
11912 11818 11867 11501 11168 10901 11247 11286    10922    11219  
% UMA  
6023 5496 5248 5130 5612 5617 5575 5722 5943 5538 5494 5257 5101 4974  
5054 5074 4974 4990 4770 4664    4683    4416  
% UMF  
2510 2512 2446 2507 2479 2413 2435 2395 2420 2349 2452 2424 2265 2227  
2238 2322 2269 2179 2061 1960    2016    2000  
% UMFK  
731 767 690 827 926 886 897 827 924 1076 1193 1339 1269 1102 1126 1073  
1080 1169 1209 1327    1559    1904  
% UMM  
856 915 884 899 908 927 1017 1068 1313 1191 1149 1259 1093 1023 964  
951 863 925 892 810    786    745  
% UMPI  
1278 1347 1307 1344 1378 1427 1367 1560 1546 1652 1548 1655 1533 1455  
1436 1434 1453 1463 1263 1138    1289    1326  
% USM  
9721 9966 10230 10462 10645 10820 10966 11382 11007 11089 10974 10478  
10453 10009 9655 9654 9301 9385 8923 8428    7739    7855  
];  
  
% Get data needed to make the fitting.  
year = enrollment(1,:);  
um = enrollment(2,:) / 1e3;  
  
% Perform curve fitting.  
% I chose poly5 because the curve appeared to fit the data the best  
% without  
% overfitting. The future values of poly5 also look reasonable.  
f = fit(year', um', 'poly5', 'Normalize', 'on');  
  
% This is for calculating future confidence intervals  
yearFuture = (2016:1:2020).';  
enrollFuture = f(yearFuture);  
ci = predint(f, yearFuture, 0.95, 'observation');
```

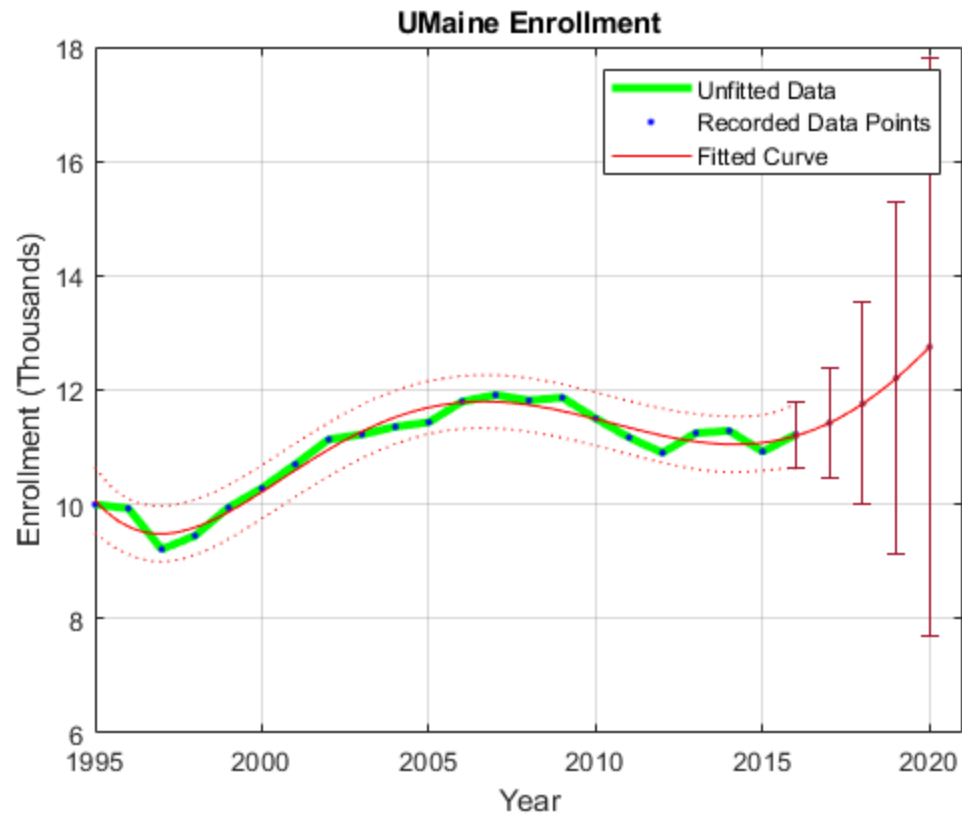
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```
% Make a plot of the regular data and fitted data.
figure(1);

% Plot the regular data.
plot(year, um, 'LineWidth', 3, 'Color', 'g');
hold on;
% Plot the fitted data and future data.
plot(f, year, um, 'predobs');
plot(f)
% Plot the future confidence intervals.
errorbar(yearFuture, enrollFuture, enrollFuture-ci(:,1), ci(:,2)-
enrollFuture, '.');

% Make the graph look nice.
grid on;
title('UMaine Enrollment');
xlabel('Year');
ylabel('Enrollment (Thousands)');
legend('Unfitted Data', 'Recorded Data Points', 'Fitted Curve');
xlim([1995 2021]);

% Make a plot of the residuals.
figure(2);
plot(f, year, um, 'residuals');
xlim([1995 2016]);
xlabel('Year');
ylabel('Residuals');
title('Residuals Plot');
grid on;
```



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