Rutgers CS323 (04), Spring 2017, Homework 3

Due at 11:55pm on March 10, 2017, submitted via Sakai

n-th Order Polynomial Interpolation

You are asked to implement the following three functions:

```
1. function P = Pn(X,x,y)
2. function TestPn(n)
3. function TestExpSin(n)
```

for testing $P_n(x)$ as approximations to

1. $f(x) = n$-th order polynomial, i.e., exact fit
2. $f(x) = e^{\sin(x)}$.

The testing code has been largely written as follows.

```
function TestPn(n)

X = -5:0.001:5;
A = (2*rand(1,n+1)-1).*[1:n+1];

%% generate a n-th order polynomial using A as coefficients
%% sample (n+1) data points (x,y)

P = Pn(X,x,y);
figure;
plot(X,Y,'k-','linewidth',2);hold on; grid on;
plot(X,P,'r--','linewidth',2);
set(gca,'fontsize',20);xlabel('x');ylabel('y');
plot(x,y,'go','linewidth',3);
set(gca,'xtick',min(X):max(X));
%% plot the title
%%


function TestExpSin(n)

X = -5:0.001:5;

% generate Y as needed
% sample (n+1) data points (x,y)

P = Pn(X,x,y);

figure;
plot(X,Y,'k-','linewidth',2);hold on; grid on;
plot(X,P,'r--','linewidth',2);
```

```
set(gca,'fontsize',20);xlabel('x');ylabel('y');
plot(x,y,'go','linewidth',3);
set(gca,'ylim',[min(Y)-1, max(Y)+1], 'xlim',[min(X),max(X)]);
set(gca,'xtick',min(X):1:max(X));
% don't forget the title
```

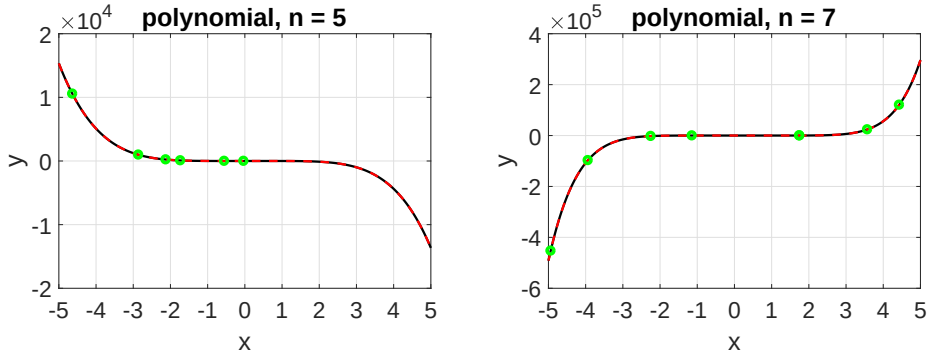

Figure 1: $f(x) = n$-th order polynomial

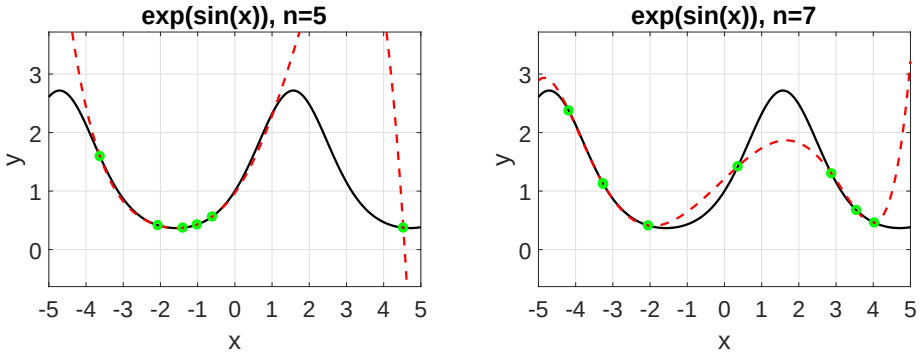

Figure 2: $f(x) = e^{\sin(x)}$.

1 Submission Instructions

Your submission should include **7** files with the following names:

- 3 matlab files:

  `[1] Pn.m`
  `[2] TestPn.m`
  `[3] TestExpSin.m`

- 2 figure files similar to Figure 1 (for $n = 5$ and 7).

  `[4] Pn5.fig`
  `[5] Pn7.fig`

- 2 figure files similar to Figure 2 (for $n = 5$ and 7) .

  `[6] ExpSin5.fig`
  `[7] ExpSin7.fig`

  All the files should be submitted to Sakai in one zipped file.