姓名：王惠恒 学号：3200300395 第二次编程作业报告

B.

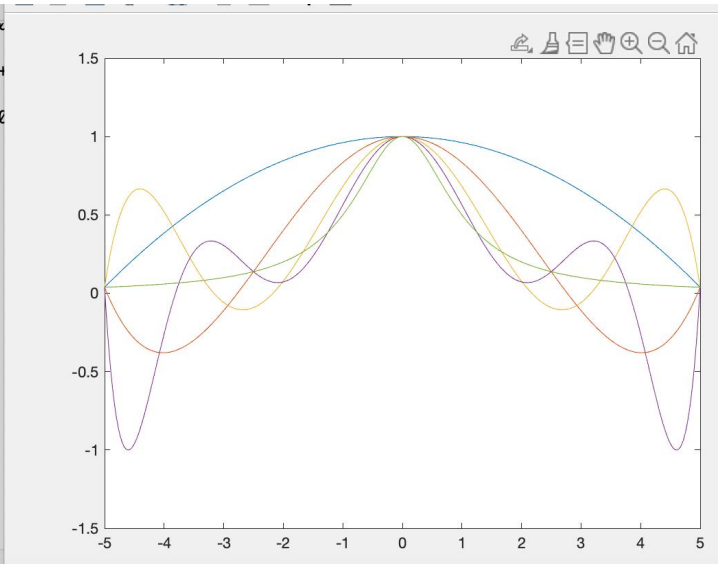
```
The amount of nodes are 3
x1=-5
y1=0.0384615
x2=0
y2=1
x3=5
y3=0.0384615

Please enter the amount of nodes :3

x1=-5
f(x1)=0.0384615

x2=0
f(x2)=1

x3=5
f(x3)=0.0384615

Divided Difference Table
x   f(x)
-5  0.0384615   0.192308    -0.0384615
0   1   -0.192308
5   0.0384615

The newton polynomial is
    0.0384615+(0.192308)*[x-(-5)]+(-0.0384615)*[x-(0)]*[x-(-5)]
```

```
Please enter the amount of nodes :5

x1=-5
f(x1)=0.0384165

x2=-2.5
f(x2)=0.137931

x3=0
f(x3)=1

x4=2.5
f(x4)=0.137931

x5=5
f(x5)=0.0384165

Divided Difference Table
x   f(x)
-5  0.0384165   0.0398058   0.0610044   -0.0265247
    0.00530494
-2.5    0.137931    0.344828    -0.137931   0.0265247
0   1   -0.344828   0.0610044
2.5 0.137931    -0.0398058
5   0.0384165

The newton polynomial is
    0.0384165+(0.0398058)*[x-(-5)]+(0.0610044)*[x-(-2.5)]*
    [x-(-5)]+(-0.0265247)*[x-(0)]*[x-(-2.5)]*
    [x-(-5)]+(0.00530494)*[x-(2.5)]*[x-(0)]*[x-(-2.5)]*[x-(-5)]
```

```
Please enter the amount of nodes :7

x1=-5
f(x1)=0.0384615

x2=-3.333333
f(x2)=0.0825688

x3=-1.666667
f(x3)=0.264706

x4=0
f(x4)=1

x5=1.666667
f(x5)=0.264706

x6=3.333333
f(x6)=0.0825688

x7=5
f(x7)=0.0384615

Divided Difference Table
x   f(x)
-5  0.0384615   0.0264644   0.0248454   0.0149446
    -0.0131699  0.00420316  -0.000840632
-3.33333    0.0825688   0.109282    0.0995682   -0.0728548
    0.0218564   -0.00420316
-1.66667    0.264706    0.441176    -0.264706   0.0728548
    -0.0131699
0   1   -0.441176   0.0995682   -0.0149446
1.66667 0.264706    -0.109282   0.0248454
3.33333 0.0825688   -0.0264644
5   0.0384615

The newton polynomial is
    0.0384615+(0.0264644)*[x-(-5)]+(0.0248454)*[x-(-3.33333)]*
    [x-(-5)]+(0.0149446)*[x-(-1.66667)]*[x-(-3.33333)]*
    [x-(-5)]+(-0.0131699)*[x-(0)]*[x-(-1.66667)]*
    [x-(-3.33333)]*[x-(-5)]+(0.00420316)*[x-(1.66667)]*
    [x-(0)]*[x-(-1.66667)]*[x-(-3.33333)]*
    [x-(-5)]+(-0.000840632)*[x-(3.33333)]*[x-(1.66667)]*
    [x-(0)]*[x-(-1.66667)]*[x-(-3.33333)]*[x-(-5)]
```

```
Please enter the amount of nodes :9
x1=-5
f(x1)=0.0384615
x2=-3.75
f(x2)=0.06639
x3=-2.5
f(x3)=0.3902244244137931
x4=-1.25
f(x4)=0.390244
x5=0
f(x5)=1
x6=1.25
f(x6)=0.390244
x7=2.5
f(x7)=0.137931
x8=3.75
f(x8)=0.06639
x9=5
f(x9)=0.0384615

Divided Difference Table
x   f(x)
-5  0.0384615   0.0223428   0.013956    0.0117043   0.00067433  -0.00489646 0.00243964
    -0.000687223    0.000137445
-3.75   0.06639 0.0572328   0.057847    0.0150759   -0.0299286  0.0134008   -0.00357356
    0.000687223
-2.5    0.137931    0.20185 0.114382    -0.134567   0.0538267   -0.0134008  0.00243964
-1.25   0.390244    0.487805    -0.390244   0.134567    -0.0299286  0.00489646
0   1   -0.487805   0.114382    -0.0150759  0.00067433
1.25    0.390244    -0.20185    0.057847    -0.0117043
2.5 0.137931    -0.0572328  0.013956
3.75    0.06639 -0.0223428
5   0.0384615

The newton polynomial is
    0.0384615+(0.0223428)*[x-(-5)]+(0.013956)*[x-(-3.75)]*[x-(-5)]+(0.0117043)*[x-(-2.5)]*
    [x-(-3.75)]*[x-(-5)]+(0.00067433)*[x-(-1.25)]*[x-(-2.5)]*[x-(-3.75)]*
    [x-(-5)]+(-0.00489646)*[x-(0)]*[x-(-1.25)]*[x-(-2.5)]*[x-(-3.75)]*
    [x-(-5)]+(0.00243964)*[x-(1.25)]*[x-(0)]*[x-(-1.25)]*[x-(-2.5)]*[x-(-3.75)]*
    [x-(-5)]+(-0.000687223)*[x-(2.5)]*[x-(1.25)]*[x-(0)]*[x-(-1.25)]*[x-(-2.5)]*
    [x-(-3.75)]*[x-(-5)]+(0.000137445)*[x-(3.75)]*[x-(2.5)]*[x-(1.25)]*[x-(0)]*[x-(-1.25)]*
    [x-(-2.5)]*[x-(-3.75)]*[x-(-5)]
```

```
命令行窗口
>> plot(x,y,x,y2)
>> y3=0.0384615+0.0264644.*(x+5)+0.0248454.*(x+3.33333).*(x+
>> plot(x,y,x,y2,x,y3)
>> y4=0.0384615+0.0223428.*(x+5)+0.013956.*(x+3.75).*(x+5)+0
>> plot(x,y,x,y2,x,y3,x,y4)
>> y0=0;
>> plot(x,y,y2,x,y3,x,y4,x,y0)
错误使用 plot
数据必须为单个 y 值输入或者一对或多对 x 和 y 值。

>> plot(x,y,x,y2,x,y3,x,y4,x,y0)
>> plot(x,y,x,y2,x,y3,x,y4,x,y0)
>> y10=sin(x);
>> plot(x,y,x,y2,x,y3,x,y4,x,y10,x,y0)
>> plot(x,y,x,y2,x,y3,x,y4,x,y0)
>> yt=1/(1+x.*x);
错误使用 /
矩阵维度必须一致。

>> yt=1./(1+x.*x);
>> plot(x,y,x,y2,x,y3,x,y4,x,y0,x,yt)
fx >>
```



输入节点数量就可以计算出节点的值，此举避免了手算节点失误的可能。缺点是需要重新输入节点，在构造函数时主要想法是让用户输入节点便可以得到一个牛顿多项式，但本题已经给定函数，从函数计算节点，所以在用户操作上比较琐碎。得出的牛顿多项式放在 matlab 上做图，取的分点是 0.01 的细度。

在 matlab 的代码中，注释：y(n=2),y2(n=4),y3(n=6),y4(n=8)，且 yt 表示原函数，即图上绿色的曲线。

请问有什么优化的建议吗?

C.

n=5

```
The amount of nodes are 5
x1=0.951057
y1=0.0423501
x2=0.587785
y2=0.103764
x3=6.12323e-17
y3=1
x4=-0.587785
y4=0.103764
x5=-0.951057
y5=0.0423501

Please enter the amount of nodes :5
x1=0.951057
f(x1)=0.0423501
x2=0.587785
f(x2)=0.103764
x3=6.12323e-17
f(x3)=1
x4=-0.587785
f(x4)=0.103764
x5=-0.951057
f(x5)=0.0423501

Divided Difference Table
x   f(x)
0.951057    0.0423501   -0.169058   1.42548 2.61207 2.7465
0.587785    0.103764    -1.52477    -2.59409    -2.61207
6.12323e-17 1   1.52477 1.42548
-0.587785   0.103764    0.169058
-0.951057   0.0423501

The newton polynomial is
    0.0423501+(-0.169058)*[x-(0.951057)]+(1.42548)*[x-(0.587785)]*[x-(0.951057)]+(2.61207)*
    [x-(6.12323e-17)]*[x-(0.587785)]*[x-(0.951057)]+(2.7465)*[x-(-0.587785)]*
    [x-(6.12323e-17)]*[x-(0.587785)]*[x-(0.951057)]
```

N=10

```
Please enter the amount of nodes :10
x1=0.987688
f(x1)=0.0393884
x2=0.891007
f(x2)=0.0479678
x3=0.707107
f(x3)=0.0740741
x4=0.45399
f(x4)=0.162531
x5=0.156434
f(x5)=0.620427
x6=-0.156434
f(x6)=0.620427
x7=-0.45399
f(x7)=0.162531
x8=-0.707107
f(x8)=0.0740741
x9=-0.891007
f(x9)=0.0479678
x10=-0.987688
f(x10)=0.0393884

Divided Difference Table
x   f(x)
0.987688    0.0393884   -0.0887393  0.189678    -0.534306   2.1168  8.28742 11.9543 10.3568
    5.51277 -0
0.891007    0.0479678   -0.141959   0.474836    -2.29391    -7.36502    -8.94684
    -5.59837    -0  5.51277
0.707107    0.0740741   -0.34947    2.15988 5.42052 4.66845 -0  -5.59837    -10.3568
0.45399 0.162531    -1.53886    -2.52096    -0  4.66845 8.94684 11.9543
0.156434    0.620427    -0  -2.52096    -5.42052    -7.36502    -8.28742
-0.156434   0.620427    1.53886 2.15988 2.29391 2.1168
-0.45399    0.162531    0.34947 0.474836    0.534306
-0.707107   0.0740741   0.141959    0.189678
-0.891007   0.0479678   0.0887393
-0.987688   0.0393884

The newton polynomial is
    0.0393884+(-0.0887393)*[x-(0.987688)]+(0.189678)*[x-(0.891007)]*
    [x-(0.987688)]+(-0.534306)*[x-(0.707107)]*[x-(0.891007)]*[x-(0.987688)]+(2.1168)*
    [x-(0.45399)]*[x-(0.707107)]*[x-(0.891007)]*[x-(0.987688)]+(8.28742)*[x-(0.156434)]*
    [x-(0.45399)]*[x-(0.707107)]*[x-(0.891007)]*[x-(0.987688)]+(11.9543)*[x-(-0.156434)]*
    [x-(0.156434)]*[x-(0.45399)]*[x-(0.707107)]*[x-(0.891007)]*[x-(0.987688)]+(10.3568)*
    [x-(-0.45399)]*[x-(-0.156434)]*[x-(0.156434)]*[x-(0.45399)]*[x-(0.707107)]*
    [x-(0.891007)]*[x-(0.987688)]+(5.51277)*[x-(-0.707107)]*[x-(-0.45399)]*[x-(-0.156434)]*
    [x-(0.156434)]*[x-(0.45399)]*[x-(0.707107)]*[x-(0.891007)]*[x-(0.987688)]+(-0)*
    [x-(-0.891007)]*[x-(-0.707107)]*[x-(-0.45399)]*[x-(-0.156434)]*[x-(0.156434)]*
    [x-(0.45399)]*[x-(0.707107)]*[x-(0.891007)]*[x-(0.987688)]
Program ended with exit code: 0
```

N=15

```
Divided Difference Table
x   f(x)
0.994522    0.0388699   -0.080069   0.134937    -0.231632   0.448793    -1.04812    2.33888
    14.0282 6.93593 -47.5344    -140.626    -235.753    -302.205    -331.788    -333.616
0.951057    0.0423501   -0.097408   0.193164    -0.414173   1.06486 -2.88791    -11.6124
    5.68817 73.5439 174.979 269.035 326.513 343.316 331.788
0.866025    0.0506329   -0.137569   0.343622    -0.993798   3.211   8.15619 -18.2049
    -94.1693    -195.72 -280.822    -324.265    -326.513    -302.205
0.743145    0.0675374   -0.233178   0.800061    -3.107  -3.85247    27.7071 101.65  190.371
    256.169 280.822 269.035 235.753
0.587785    0.103764    -0.502325   2.46303 -0.244055   -30.2035    -89.1788    -151.72
    -190.371    -195.72 -174.979    -140.626
0.406737    0.194709    -1.43796    2.60648 23.7887 58.4868 89.1788 101.65  94.1693 73.5439
    47.5344
0.207912    0.480612    -2.49811    -12.0152    -23.7887    -30.2035    -27.7071
    -18.2049    -5.68817    6.93593
2.83277e-16 1   2.49811 2.60648 0.244055    -3.85247    -8.15619    -11.6124    -14.0282
-0.207912   0.480612    1.43796 2.46303 3.107   3.211   2.88791 2.33888
-0.406737   0.194709    0.502325    0.800061    0.993798    1.06486 1.04812
-0.587785   0.103764    0.233178    0.343622    0.414173    0.448793
-0.743145   0.0675374   0.137569    0.193164    0.231632
-0.866025   0.0506329   0.097408    0.134937
-0.951057   0.0423501   0.080069
-0.994522   0.0388699
```

```
The newton polynomial is
    0.0388699+(-0.080069)*[x-(0.994522)]+(0.134937)*[x-(0.951057)]*
    [x-(0.994522)]+(-0.231632)*[x-(0.866025)]*[x-(0.951057)]*[x-(0.994522)]+(0.448793)*
    [x-(0.743145)]*[x-(0.866025)]*[x-(0.951057)]*[x-(0.994522)]+(-1.04812)*[x-(0.587785)]*
    [x-(0.743145)]*[x-(0.866025)]*[x-(0.951057)]*[x-(0.994522)]+(2.33888)*[x-(0.406737)]*
    [x-(0.587785)]*[x-(0.743145)]*[x-(0.866025)]*[x-(0.951057)]*[x-(0.994522)]+(14.0282)*
    [x-(0.207912)]*[x-(0.406737)]*[x-(0.587785)]*[x-(0.743145)]*[x-(0.866025)]*
    [x-(0.951057)]*[x-(0.994522)]+(6.93593)*[x-(2.83277e-16)]*[x-(0.207912)]*
    [x-(0.406737)]*[x-(0.587785)]*[x-(0.743145)]*[x-(0.866025)]*[x-(0.951057)]*
    [x-(0.994522)]+(-47.5344)*[x-(-0.207912)]*[x-(2.83277e-16)]*[x-(0.207912)]*
    [x-(0.406737)]*[x-(0.587785)]*[x-(0.743145)]*[x-(0.866025)]*[x-(0.951057)]*
    [x-(0.994522)]+(-140.626)*[x-(-0.406737)]*[x-(-0.207912)]*[x-(2.83277e-16)]*
    [x-(0.207912)]*[x-(0.406737)]*[x-(0.587785)]*[x-(0.743145)]*[x-(0.866025)]*
    [x-(0.951057)]*[x-(0.994522)]+(-235.753)*[x-(-0.587785)]*[x-(-0.406737)]*
    [x-(-0.207912)]*[x-(2.83277e-16)]*[x-(0.207912)]*[x-(0.406737)]*[x-(0.587785)]*
    [x-(0.743145)]*[x-(0.866025)]*[x-(0.951057)]*[x-(0.994522)]+(-302.205)*[x-(-0.743145)]*
    [x-(-0.587785)]*[x-(-0.406737)]*[x-(-0.207912)]*[x-(2.83277e-16)]*[x-(0.207912)]*
    [x-(0.406737)]*[x-(0.587785)]*[x-(0.743145)]*[x-(0.866025)]*[x-(0.951057)]*
    [x-(0.994522)]+(-331.788)*[x-(-0.866025)]*[x-(-0.743145)]*[x-(-0.587785)]*
    [x-(-0.406737)]*[x-(-0.207912)]*[x-(2.83277e-16)]*[x-(0.207912)]*[x-(0.406737)]*
    [x-(0.587785)]*[x-(0.743145)]*[x-(0.866025)]*[x-(0.951057)]*[x-(0.994522)]+(-333.616)*
    [x-(-0.951057)]*[x-(-0.866025)]*[x-(-0.743145)]*[x-(-0.587785)]*[x-(-0.406737)]*
    [x-(-0.207912)]*[x-(2.83277e-16)]*[x-(0.207912)]*[x-(0.406737)]*[x-(0.587785)]*
    [x-(0.743145)]*[x-(0.866025)]*[x-(0.951057)]*[x-(0.994522)]
```

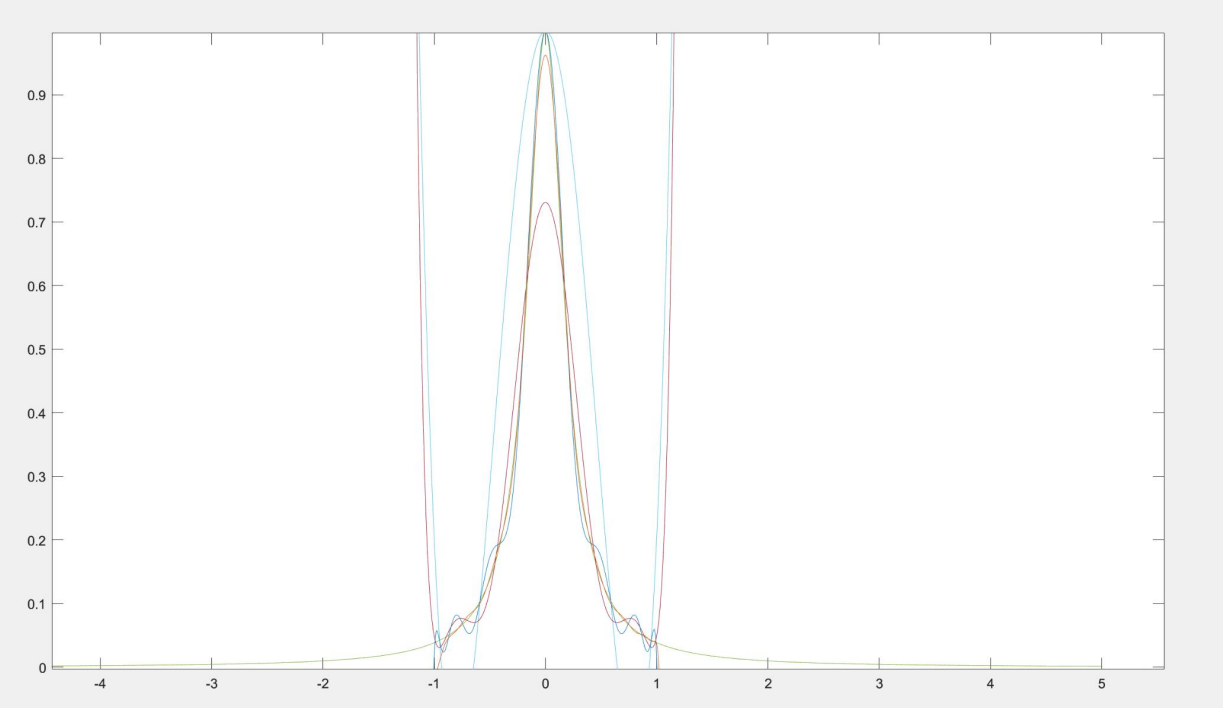
N=20

```
Divided Difference Table
x   f(x)
0.996917    0.0386906   -0.0773129  0.120793    -0.178697   0.272785    -0.436954   0.797507    -1.41891    1.16382
    23.8743 -24.0247    -331.338    -965.795    -1734.28    -2309.86    -2462.34    -2166.89    -1552.43    -788.32 -0
0.97237 0.0405884   -0.0861353  0.146575    -0.243214   0.424614    -0.815306   1.66905 -2.30746    -20.7637    49.7098
    383.641 1001.07 1669.29 2068.59 2017.27 1545.45 815.004 -0  -788.32
0.92388 0.0447651   -0.103685   0.198128    -0.380331   0.791396    -1.79952    3.37409 16.2534 -73.0002    -412.89
    -972.866    -1494.3 -1685.59    -1426.89    -803.192    -0  815.004 1552.43
0.85264 0.0521516   -0.136073   0.302503    -0.697982   1.76529 -4.12911    -10.3669    89.4244 404.848 858.22  1188.46
    1157.68 717.697 -0  -803.192    -1545.45    -2166.89
0.760406    0.0647022   -0.19754    0.532935    -1.52759    4.32202 3.89674 -93.6299    -350.275    -655.331
    -776.084    -550.471    -0  717.697 1426.89 2017.27 2462.34
0.649448    0.0866208   -0.324329   1.10994 -3.80513    1.66465 82.4396 254.491 398.826 340.311 -0  -550.471
    -1157.68    -1685.59    -2068.59    -2309.86
0.522499    0.127794    -0.620423   2.69289 -4.75563    -58.3437    -142.249    -157.15 -0  340.311 776.084 1188.46
    1494.3  1669.29 1734.28
0.382683    0.214539    -1.39881    4.80458 30.3065 49.1886 -0  -157.15 -398.826    -655.331    -858.22 -972.866
    -1001.07    -965.795
0.233445    0.423295    -2.86048    -9.17102    -0  49.1886 142.249 254.491 350.275 404.848 412.89  383.641 331.338
0.0784591   0.866629    -0  -9.17102    -30.3065    -58.3437    -82.4396    -93.6299    -89.4244    -73.0002
    -49.7098    -24.0247
-0.0784591  0.866629    2.86048 4.80458 4.75563 1.66465 -3.89674    -10.3669    -16.2534    -20.7637    -23.8743
-0.233445   0.423295    1.39881 2.69289 3.80513 4.32202 4.12911 3.37409 2.30746 1.16382
-0.382683   0.214539    0.620423    1.10994 1.52759 1.76529 1.79952 1.66905 1.41891
-0.522499   0.127794    0.324329    0.532935    0.697982    0.791396    0.815306    0.797507
-0.649448   0.0866208   0.19754 0.302503    0.380331    0.424614    0.436954
-0.760406   0.0647022   0.136073    0.198128    0.243214    0.272785
-0.85264    0.0521516   0.103685    0.146575    0.178697
-0.92388    0.0447651   0.0861353   0.120793
-0.97237    0.0405884   0.0773129
-0.996917   0.0386906
```

```
The newton polynomial is
    0.0386906+(-0.0773129)*[x-(0.996917)]+(0.120793)*[x-(0.97237)]*[x-(0.996917)]+(-0.178697)*[x-(0.92388)]*
    [x-(0.97237)]*[x-(0.996917)]+(0.272785)*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-0.436954)*
    [x-(0.760406)]*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(0.797507)*[x-(0.649448)]*[x-(0.760406)]*
    [x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-1.41891)*[x-(0.522499)]*[x-(0.649448)]*[x-(0.760406)]*
    [x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(1.16382)*[x-(0.382683)]*[x-(0.522499)]*[x-(0.649448)]*
    [x-(0.760406)]*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(23.8743)*[x-(0.233445)]*[x-(0.382683)]*
    [x-(0.522499)]*[x-(0.649448)]*[x-(0.760406)]*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-24.0247)*
    [x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*[x-(0.522499)]*[x-(0.649448)]*[x-(0.760406)]*[x-(0.85264)]*
    [x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-331.338)*[x-(-0.0784591)]*[x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*
    [x-(0.522499)]*[x-(0.649448)]*[x-(0.760406)]*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-965.795)*
    [x-(-0.233445)]*[x-(-0.0784591)]*[x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*[x-(0.522499)]*[x-(0.649448)]*
    [x-(0.760406)]*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-1734.28)*[x-(-0.382683)]*[x-(-0.233445)]*
    [x-(-0.0784591)]*[x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*[x-(0.522499)]*[x-(0.649448)]*[x-(0.760406)]*
    [x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-2309.86)*[x-(-0.522499)]*[x-(-0.382683)]*[x-(-0.233445)]*
    [x-(-0.0784591)]*[x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*[x-(0.522499)]*[x-(0.649448)]*[x-(0.760406)]*
    [x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-2462.34)*[x-(-0.649448)]*[x-(-0.522499)]*[x-(-0.382683)]*
    [x-(-0.233445)]*[x-(-0.0784591)]*[x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*[x-(0.522499)]*[x-(0.649448)]*
    [x-(0.760406)]*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-2166.89)*[x-(-0.760406)]*[x-(-0.649448)]*
    [x-(-0.522499)]*[x-(-0.382683)]*[x-(-0.233445)]*[x-(-0.0784591)]*[x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*
    [x-(0.522499)]*[x-(0.649448)]*[x-(0.760406)]*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-1552.43)*
    [x-(-0.85264)]*[x-(-0.760406)]*[x-(-0.649448)]*[x-(-0.522499)]*[x-(-0.382683)]*[x-(-0.233445)]*[x-(-0.0784591)]*
    [x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*[x-(0.522499)]*[x-(0.649448)]*[x-(0.760406)]*[x-(0.85264)]*
    [x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-788.32)*[x-(-0.92388)]*[x-(-0.85264)]*[x-(-0.760406)]*[x-(-0.649448)]*
    [x-(-0.522499)]*[x-(-0.382683)]*[x-(-0.233445)]*[x-(-0.0784591)]*[x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*
    [x-(0.522499)]*[x-(0.649448)]*[x-(0.760406)]*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]+(-0)*
    [x-(-0.97237)]*[x-(-0.92388)]*[x-(-0.85264)]*[x-(-0.760406)]*[x-(-0.649448)]*[x-(-0.522499)]*[x-(-0.382683)]*
    [x-(-0.233445)]*[x-(-0.0784591)]*[x-(0.0784591)]*[x-(0.233445)]*[x-(0.382683)]*[x-(0.522499)]*[x-(0.649448)]*
    [x-(0.760406)]*[x-(0.85264)]*[x-(0.92388)]*[x-(0.97237)]*[x-(0.996917)]
Program ended with exit code: 0
```

利用 Chebyshev 多项式找出节点，蓝色曲线是原函数。在[–1,1]区间内一样使用 0.01 的细度。在 matlab 的注释：

y 表示原函数，y1(n=5),y2(n=10),y3(n=15), y4(n=20)



D.

(a)

```
Divided Difference Table
x   f(x)
0   0   75  0   0.222222    -0.0311111  -0.00644444 0.00226389  -0.000913194    0.000130527
    -2.02236e-05
0   0   75  0.666667    0.0666667   -0.0633333  0.0116667   -0.00504167 0.000783654
    -0.00013238
3   225 77  1   -0.25   0.03    -0.0286667  0.00514583  -0.000937292
3   225 79  0.5 -0.1    -0.113333   0.0227917   -0.00422708
5   383 80  0   -0.666667   0.114583    -0.0194792
5   383 80  -2  0.25    -0.04125
8   623 74  0   -0.08
8   623 74  -0.4
13  993 72
13  993

The hermite polynomial is
    0+(75)*[x-(0)]+(0)*[x-(0)]*[x-(0)]+(0.222222)*[x-(3)]*[x-(0)]*[x-(0)]+(-0.0311111)*
    [x-(3)]*[x-(3)]*[x-(0)]*[x-(0)]+(-0.00644444)*[x-(5)]*[x-(3)]*[x-(3)]*[x-(0)]*
    [x-(0)]+(0.00226389)*[x-(5)]*[x-(5)]*[x-(3)]*[x-(3)]*[x-(0)]*[x-(0)]+(-0.000913194)*
    [x-(8)]*[x-(5)]*[x-(5)]*[x-(3)]*[x-(3)]*[x-(0)]*[x-(0)]+(0.000130527)*[x-(8)]*[x-(8)]*
    [x-(5)]*[x-(5)]*[x-(3)]*[x-(3)]*[x-(0)]*[x-(0)]+(-2.02236e-05)*[x-(13)]*[x-(8)]*
    [x-(8)]*[x-(5)]*[x-(5)]*[x-(3)]*[x-(3)]*[x-(0)]*[x-(0)]
Please enter a variable value :
10

The appoximate value is: 742.503
Program ended with exit code: 0
```

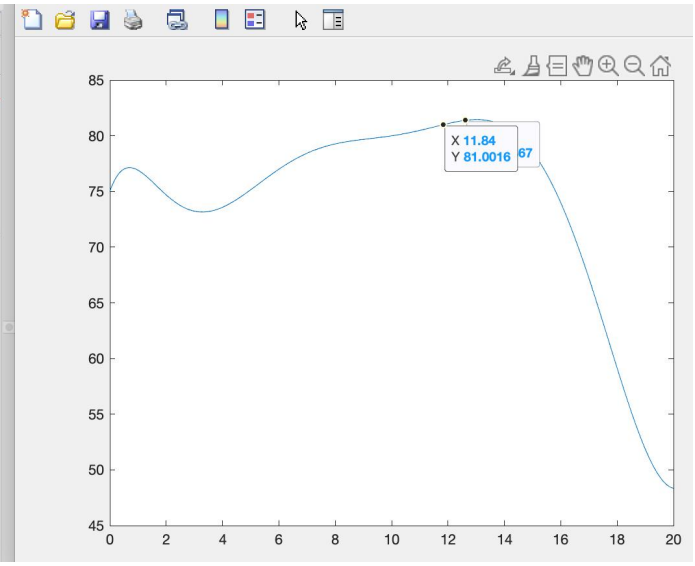
The approximate position at t=10s is 743 feet.

The derivative of hermite polynomial is $f'(x) = -0.0001820124x^8 + 0.008324712x^7 - 0.153129522x^6 + 1.458246384x^5 - 7.69147309x^4 + 22.03244x^3 - 30.2859x^2 + 14.32382x + 75.$

The approximate velocity at t=10s is 48.3537 feet/s

(b)

```
命令行窗口
>> x=0:0.01:10;
>> y=-0.0001820124x^8+0.008324712x^7-0.153129522x^6+1.458246384x^
 y=-0.0001820124x^8+0.008324712x^7-0.153129522x^6+1.458246384x^5-
                    ↑
无效表达式。请检查缺失的乘法运算符、缺失或不对称的分隔符或者其他语法错误。要构
造矩阵，请使用方括号而不是圆括号。

是不是想输入:
>> y=-0.0001820124*x^8+0.008324712*x^7-0.153129522*x^6+1.45824638
错误使用 ^
用于对矩阵求幂的维度不正确。请检查并确保矩阵为方阵并且幂为标量。要单独对矩阵的
每个元素进行运算，请使用 POWER (.^)执行按元素求幂。

>> y=-0.0001820124.*x.^8+0.008324712.*x.^7-0.153129522.*x.^6+1.45
>> plot(x,y)
>> x=0:0.1:13;
>> plot(x,y)
错误使用 plot
向量长度必须相同。

>> x=0:0.02:20;
>> plot(x,y)
>>
```



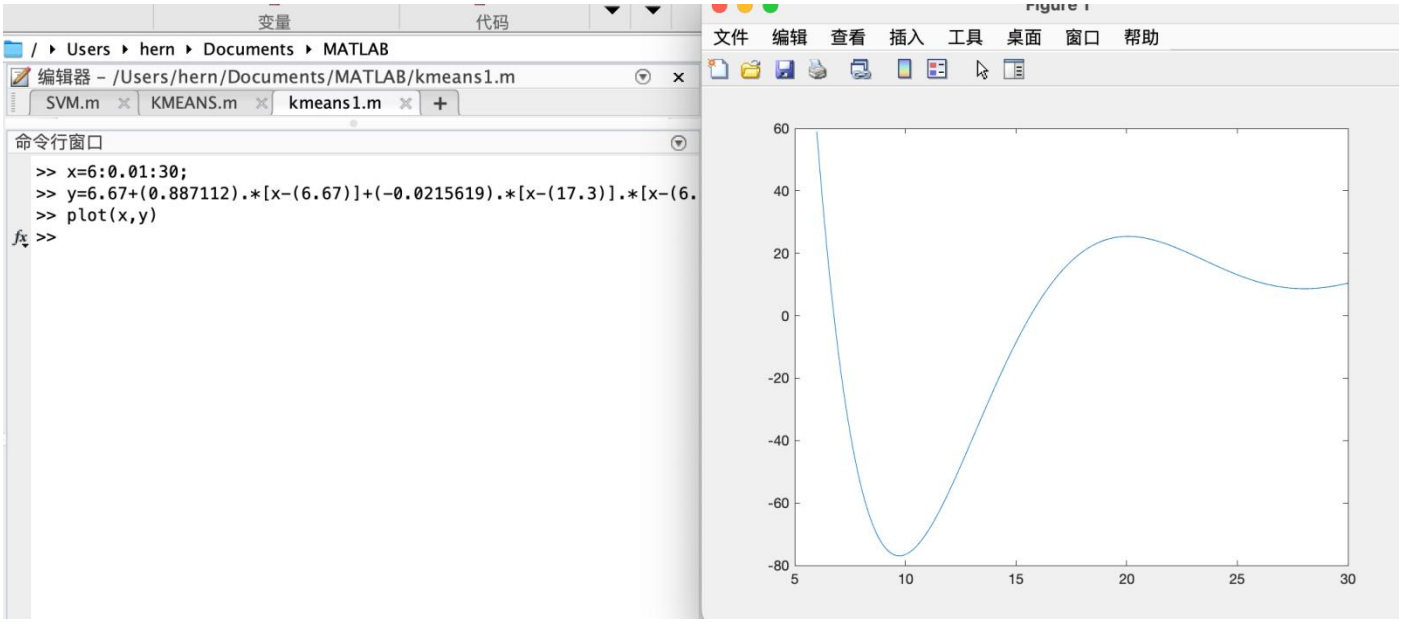
When t=11.84s, the velocity of the car exceeds 81 feet/s.

E.

（a）方程如下：

```
Please enter the amount of nodes :7
x1=6.67
f(x1)=6.67
x2=17.3
f(x2)=16.1
x3=42.7
f(x3)=18.9
x4=37.3
f(x4)=15
x5=30.1
f(x5)=10.6
x6=29.3
f(x6)=9.44
x7=28.7
f(x7)=8.89

Divided Difference Table
x   f(x)
6.67    6.67    0.887112    -0.0215619  0.00170295  -0.000145309    4.39272e-05 1.31058e-05
17.3    16.1    0.110236    0.0305993   -0.00170164 0.000848765 0.000332649
42.7    18.9    0.722222    0.00881834  0.00848354  0.00464096
37.3    15  0.611111    -0.104861   -0.0564899
30.1    10.6    1.45    0.380952
29.3    9.44    0.916667
28.7    8.89

The newton polynomial is
    6.67+(0.887112)*[x-(6.67)]+(-0.0215619)*[x-(17.3)]*[x-(6.67)]+(0.00170295)*[x-(42.7)]*
    [x-(17.3)]*[x-(6.67)]+(-0.000145309)*[x-(37.3)]*[x-(42.7)]*[x-(17.3)]*
    [x-(6.67)]+(4.39272e-05)*[x-(30.1)]*[x-(37.3)]*[x-(42.7)]*[x-(17.3)]*
    [x-(6.67)]+(1.31058e-05)*[x-(29.3)]*[x-(30.1)]*[x-(37.3)]*[x-(42.7)]*[x-(17.3)]*
    [x-(6.67)]
```

拟合曲线如下：



(b)

```
Please enter the amount of nodes :7
x1=0
f(x1)=6.67
x2=6
f(x2)=17.3
x3=10
f(x3)=42.7
x4=13
f(x4)=37.3
x5=17
f(x5)=30.1
x6=20
f(x6)=29.3
x7=28
f(x7)=28.7

Divided Difference Table
x   f(x)
0   6.67    1.77167 0.457833    -0.124778   0.013566    -0.000978085    4.1477e-05
6   17.3    6.35    -1.16429    0.105844    -0.00599567 0.000183272
10  42.7    -1.8    4.12369e-16 0.0219048   -0.00196368
13  37.3    -1.8    0.219048    -0.0134416
17  30.1    -0.266667   0.0174242
20  29.3    -0.075
28  28.7

The newton polynomial is
    6.67+(1.77167)*[x-(0)]+(0.457833)*[x-(6)]*[x-(0)]+(-0.124778)*[x-(10)]*[x-(6)]*
    [x-(0)]+(0.013566)*[x-(13)]*[x-(10)]*[x-(6)]*[x-(0)]+(-0.000978085)*[x-(17)]*[x-(13)]*
    [x-(10)]*[x-(6)]*[x-(0)]+(4.1477e-05)*[x-(20)]*[x-(17)]*[x-(13)]*[x-(10)]*[x-(6)]*
    [x-(0)]
Please enter a variable value :
43

The appoximate value is: 14640.3
Program ended with exit code: 0
```

Line: 19 Col: 36

```
Please enter the amount of nodes :7
x1=0
f(x1)=6.67
x2=6
f(x2)=16.1
x3=10
f(x3)=18.9
x4=13
f(x4)=15
x5=17
f(x5)=10.6
x6=20
f(x6)=9.44
x7=28
f(x7)=8.89

Divided Difference Table
x   f(x)
0   6.67    1.57167 -0.0871667  -0.0152729  0.00257908  -0.000204804    8.6768e-06
6   16.1    0.7 -0.285714   0.0285714   -0.00151701 3.81462e-05
10  18.9    -1.3    0.0285714   0.00733333  -0.00067779
13  15  -1.1    0.101905    -0.00486688
17  10.6    -0.386667   0.0289015
20  9.44    -0.06875
28  8.89

The newton polynomial is
    6.67+(1.57167)*[x-(0)]+(-0.0871667)*[x-(6)]*[x-(0)]+(-0.0152729)*[x-(10)]*[x-(6)]*
    [x-(0)]+(0.00257908)*[x-(13)]*[x-(10)]*[x-(6)]*[x-(0)]+(-0.000204804)*[x-(17)]*
    [x-(13)]*[x-(10)]*[x-(6)]*[x-(0)]+(8.6768e-06)*[x-(20)]*[x-(17)]*[x-(13)]*[x-(10)]*
    [x-(6)]*[x-(0)]
Please enter a variable value :
43

The appoximate value is: 2981.48
Program ended with exit code: 0
```

两项估计值都不合常理，因此，这个方法估计是无效的。