INSTRUCTIONS TO CANDIDATES

1. This paper consists of 2 questions. Please answer ALL questions.
2. Please write programs by using MATLAB / Octave to complete the test. One program for each question.
3. Indicate which software you are using in the first line of your code (as comment). Follow by student ID and Question number.
4. Figure plotting (if any) can be done by any software. If the figure is plotted by Matlab/Octave, include the source code in the same m-file of the question. Otherwise, screenshot the source code of the figure plotting.
5. You need to copy all your codes, output results and images (if any) into single WORD file then save it as PDF-file. Use the given template.
6. Name your PDF-file as the format StudentID_CourseCode_PT1.pdf.
7. Name your M-files as the format StudentID_CourseCode_PT1_Q#.m.
8. Attached both the PDF-file and M-files of your code upon submission.
9. Communication between candidates in any means is forbidden. Answers must be entirely individual candidate's independent effort. If you are found sharing your solutions with other candidates, or suspected of doing so, you would be penalized accordingly.

Student Declaration

By attempting this exam, I acknowledge that

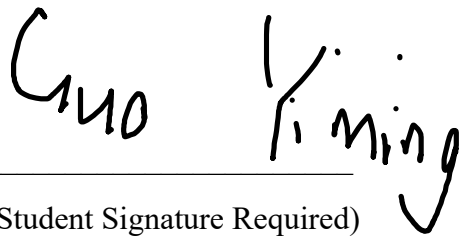
• I agree to be bound by the university's rules, codes of conduct, and other policies relating to examinations

• I have read and understand the examination conduct requirements for this exam

• I am aware of the university's rules regarding misconduct during examinations

• I am not in possession of, nor do I have access to, any unauthorised material during this examination

In attempting this examination and submitting an answer, candidates are undertaking that the work they submit is a result of their own unaided efforts and that they have not discussed the questions or possible answers with other persons during the examination period. Candidates who are found to have participated in any form of cooperation or collusion or any activity which could amount to academic misconduct in the answering of this examination will have their marks withdrawn and disciplinary action will be initiated.



(Student Signature Required)

Student Name: Guo Yiming

Student ID: PHY2009481

Q1

Iteration times i=28

Next is the list for each number

i	ai	bi	pi	f(ai)	f(pi)	error
1	0	1	0.5	-1	0.89872	0.5
2	0	0.5	0.25	-1	-0.028475	0.25
3	0.25	0.5	0.375	-0.028475	0.43937	0.125
4	0.25	0.375	0.3125	-0.028475	0.20668	0.0625
5	0.25	0.3125	0.28125	-0.028475	0.089433	0.03125
6	0.25	0.28125	0.26562	-0.028475	0.030564	0.015625
7	0.25	0.26562	0.25781	-0.028475	0.0010664	0.0078125
8	0.25	0.25781	0.25391	-0.028475	-0.013699	0.0039062
9	0.25391	0.25781	0.25586	-0.013699	-0.0063148	0.0019531
10	0.25586	0.25781	0.25684	-0.0063148	-0.0026239	0.00097656
11	0.25684	0.25781	0.25732	-0.0026239	-0.00077867	0.00048828
12	0.25732	0.25781	0.25757	-0.00077867	0.00014387	0.00024414
13	0.25732	0.25757	0.25745	-0.00077867	-0.0003174	0.00012207
14	0.25745	0.25757	0.25751	-0.0003174	-8.6763e-05	6.1035e-05
15	0.25751	0.25757	0.25754	-8.6763e-05	2.8553e-05	3.0518e-05
16	0.25751	0.25754	0.25752	-8.6763e-05	-2.9105e-05	1.5259e-05
17	0.25752	0.25754	0.25753	-2.9105e-05	-2.7598e-07	7.6294e-06
18	0.25753	0.25754	0.25753	-2.7598e-07	1.4138e-05	3.8147e-06
19	0.25753	0.25753	0.25753	-2.7598e-07	6.9313e-06	1.9073e-06
20	0.25753	0.25753	0.25753	-2.7598e-07	3.3276e-06	9.5367e-07
21	0.25753	0.25753	0.25753	-2.7598e-07	1.5258e-06	4.7684e-07
22	0.25753	0.25753	0.25753	-2.7598e-07	6.2492e-07	2.3842e-07
23	0.25753	0.25753	0.25753	-2.7598e-07	1.7447e-07	1.1921e-07
24	0.25753	0.25753	0.25753	-2.7598e-07	-5.0758e-08	5.9605e-08
25	0.25753	0.25753	0.25753	-5.0758e-08	6.1855e-08	2.9802e-08
26	0.25753	0.25753	0.25753	-5.0758e-08	5.5482e-09	1.4901e-08
27	0.25753	0.25753	0.25753	-5.0758e-08	-2.2605e-08	7.4506e-09
28	0.25753	0.25753	0.25753	-2.2605e-08	-8.5285e-09	3.7253e-09

```
Iteration times i=28
Next is the list for each number
```

i	ai	bi	pi	f(ai)	f(pi)	error
1	0	1	0.5	-1	0.89872	0.5
2	0	0.5	0.25	-1	-0.028475	0.25
3	0.25	0.5	0.375	-0.028475	0.43937	0.125
4	0.25	0.375	0.3125	-0.028475	0.20668	0.0625
5	0.25	0.3125	0.28125	-0.028475	0.089433	0.03125
6	0.25	0.28125	0.26562	-0.028475	0.030564	0.015625
7	0.25	0.26562	0.25781	-0.028475	0.0010664	0.0078125
8	0.25	0.25781	0.25391	-0.028475	-0.013699	0.0039062
9	0.25391	0.25781	0.25586	-0.013699	-0.0063148	0.0019531
10	0.25586	0.25781	0.25684	-0.0063148	-0.0026239	0.00097656
11	0.25684	0.25781	0.25732	-0.0026239	-0.00077867	0.00048828
12	0.25732	0.25781	0.25757	-0.00077867	0.00014387	0.00024414
13	0.25732	0.25757	0.25745	-0.00077867	-0.0003174	0.00012207
14	0.25745	0.25757	0.25751	-0.0003174	-8.6763e-05	6.1035e-05
15	0.25751	0.25757	0.25754	-8.6763e-05	2.8553e-05	3.0518e-05
16	0.25751	0.25754	0.25752	-8.6763e-05	-2.9105e-05	1.5259e-05
17	0.25752	0.25754	0.25753	-2.9105e-05	-2.7598e-07	7.6294e-06
18	0.25753	0.25754	0.25753	-2.7598e-07	1.4138e-05	3.8147e-06
19	0.25753	0.25753	0.25753	-2.7598e-07	6.9313e-06	1.9073e-06
20	0.25753	0.25753	0.25753	-2.7598e-07	3.3276e-06	9.5367e-07
21	0.25753	0.25753	0.25753	-2.7598e-07	1.5258e-06	4.7684e-07
22	0.25753	0.25753	0.25753	-2.7598e-07	6.2492e-07	2.3842e-07
23	0.25753	0.25753	0.25753	-2.7598e-07	1.7447e-07	1.1921e-07
24	0.25753	0.25753	0.25753	-2.7598e-07	-5.0758e-08	5.9605e-08
25	0.25753	0.25753	0.25753	-5.0758e-08	6.1855e-08	2.9802e-08
26	0.25753	0.25753	0.25753	-5.0758e-08	5.5482e-09	1.4901e-08
27	0.25753	0.25753	0.25753	-5.0758e-08	-2.2605e-08	7.4506e-09
28	0.25753	0.25753	0.25753	-2.2605e-08	-8.5285e-09	3.7253e-09

Q2

(a)The coefficient is

ai	bi	ci	di
0.038462	-0.48314	0	2.7283
0.13793	1.5631	4.0925	-7.5407
1	2.2204e-16	-7.2186	7.5407
0.13793	-1.5631	4.0925	-2.7283

(b)The coefficient is

ai	bi	ci	di
0.038462	0.062511	0	0.78724
0.06639	0.21012	0.59043	-1.145
0.13793	0.29065	-0.26833	12.571
0.39024	2.5135	9.1599	-37.832
1	4.4409e-16	-19.214	37.832
0.39024	-2.5135	9.1599	-12.571
0.13793	-0.29065	-0.26833	1.145
0.06639	-0.21012	0.59043	-0.78724

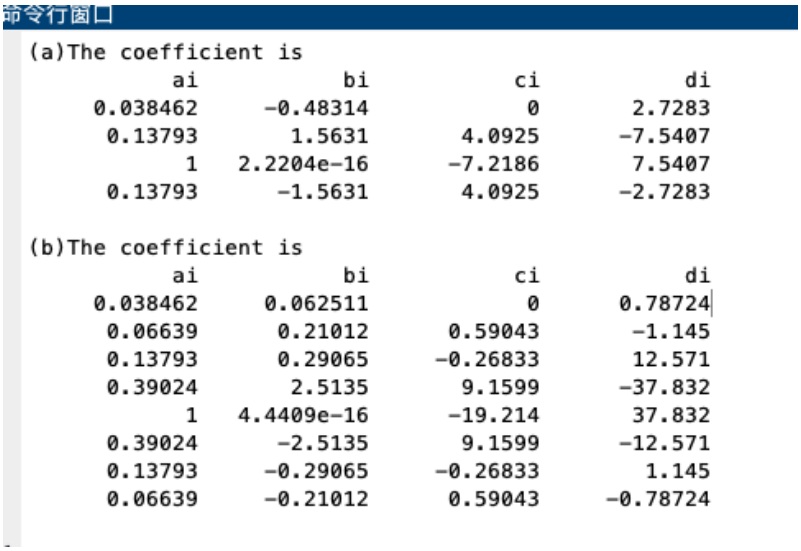
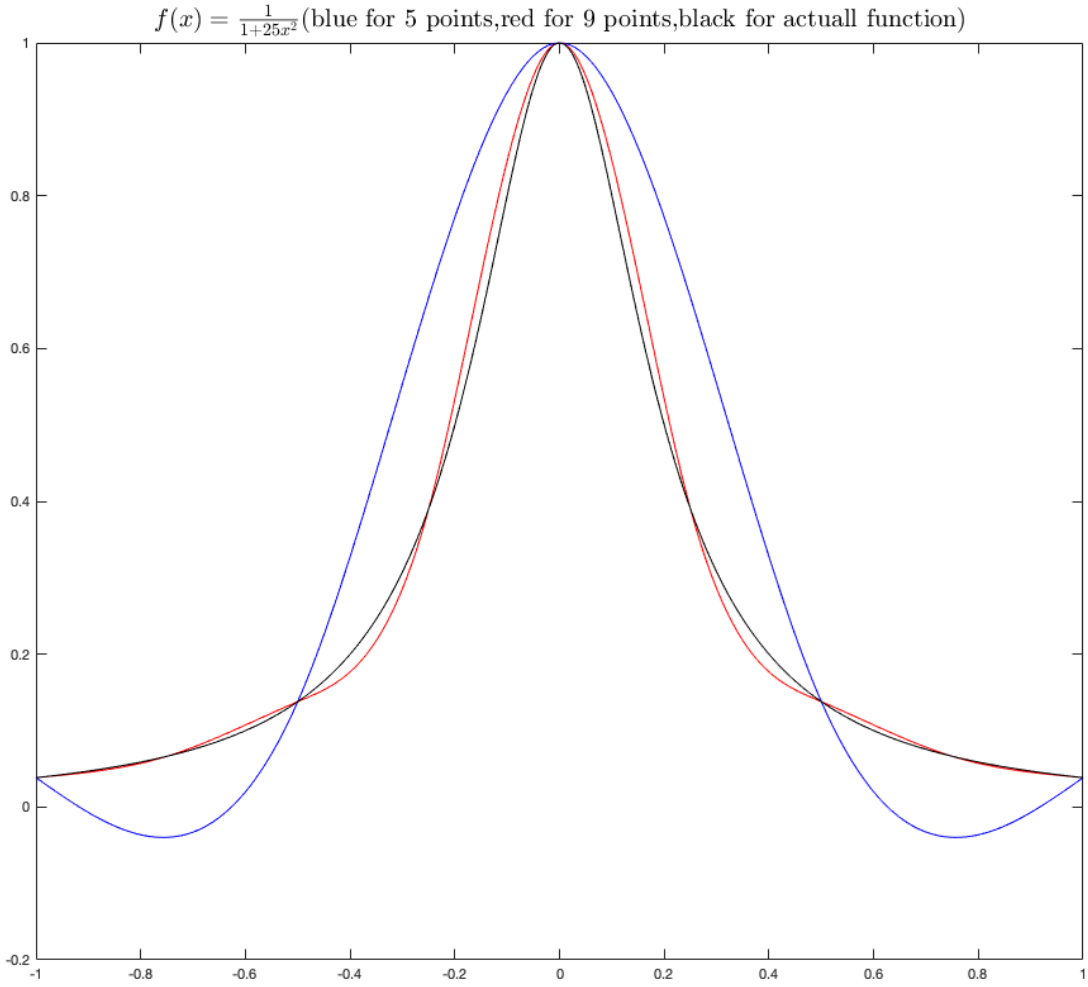


Figure in next page


$f(x) = \frac{1}{1+25x^2}$(blue for 5 points,red for 9 points,black for actuall function)
1
0.8
0.6
0.4
0.2
0
-0.2
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1