Name-Surname:

Id & Signature:

MATH 317- Homework I

Instructions: All questions are equally weighted. You may edit this file. When you finish, create a pdf file. You are free to use small pictures, screenshots (zoomed), handwriting or equation editor etc.

Question 1. Use Excel and the bisection method to approximate to solution of

$$x\cos -2+3-1=0$$

on the interval [0.2,0. 3].

Solution:

E26

	A	B	C	D	E	F	G	H	I	J	K	L
2		f(x)=xcosx-2x^2+3x-1			interval [0.2,0.3]							
3												
4												
5		inintial_int	final_int	mid_va								
6		0.2	0.3	0.25	-0.28399	0.006601	-0.13277	0.1	1			
7						06601	-0.06158	0.05	1			
8						06601	-0.02711	0.025	1			
9						06601	-0.01016	0.0125	1			
10		0.29375	0.3	0.296875	-0.01016	0.006601	-0.00176	0.00625	1			
11		0.296875	0.3	0.298438	-0.00176	0.006601	0.002428	0.003125	1			
12		0.296875	0.298438	0.297656			3	0.001563	1			
13		0.296875	0.297656	0.297266			l	0.000781	1			
14		0.297266	0.297656	0.297461	-0.00071	0.000338	-0.00019	0.000391	1			
15		0.297461	0.297656	0.297559	-0.00019	0.000338	7.6E-05	0.000195	1			
16		0.297461	0.297559	0.29751	-0.00019	7.6E-05	-5.5E-05	9.77E-05	1			
17		0.29751	0.297559	0.297534	-5.5E-05	7.6E-05	1.06E-05	4.88E-05	1			
18						1.06E-05	-2.2E-05	2.44E-05	1			
19						1.06E-05	-5.8E-06	1.22E-05	1			
20						1.06E-05	2.4E-06					
21						2.4E-06	-1.7E-06					
22						2.4E-06	3.52E-07	1.53E-06	1			
23						3.52E-07	-6.7E-07	7.63E-07	2			
24												
25			ANS=0.297	3								
26												

Question 2. The surface of many airfoils can be described with an equation of the form

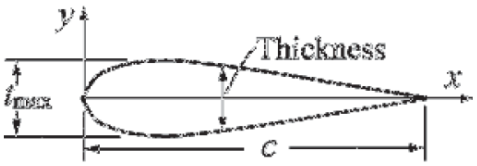
$$y = \pm\frac{tc}{0.2}\left[a_0\sqrt{\frac{x}{c}} + \frac{a_1 x}{c} + a_2\left(\frac{x}{c}\right)^2 + a_3\left(\frac{x}{c}\right)^3 + a_4\left(\frac{x}{c}\right)^4\right]$$

Where t is the maximum thickness as a fraction of the chord length ($t_{max} = ct$).

Given that c=1 m and t=0.2 m, the following values for y have been measured for a particular airfoil:

X (m)	0.15	0.35	0.5	0.7	0.85
Y(m)	0.08909	0.09914	0.08823	0.06107	0.03421

Determine the constants a_0, a_1, a_2, a_3 and a_4 by using the MINVERSE function of Excel. (Write a system of five equations and five unknowns and use Excel to solve the system.)



Solution:

C1 | fx | system of equations

	A	B	C	D	E	F	G	H	I	J
1			system of equations							
2										
3										
4	x	y								
5	0.15	0.08909		0.0				a2+0.15^3a3+0.15^4a4		
6	0.35	0.09914		0.0				a2+0.35^3a3+0.35^4a4		
7	0.5	0.08823		0.08823=				3a3+0.5^4a4		
8	0.7	0.06107		0.06107=				3a3+0.7^4a4		
9	0.85	0.03421		0.03421=				.85^3a3+0.85^4a4		
10										
11										
12		A						b		
13		0.387				506		0.0 909		
14		0.59				006		0.0 914		
15		0.70				906		0.0 323		
16			0.7	0.49	0.343	0.2401		0.0 107		
17		0.92 954	0.85					0.03		
18										

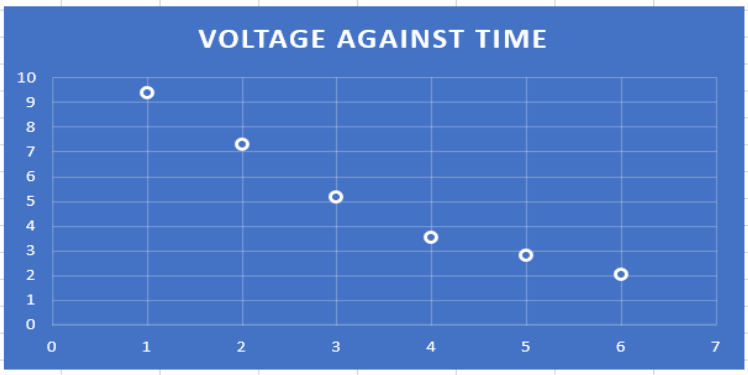
20		A^-1						a's solutions
21		12.63063	-12.7221	0.944405	3.732199	-1.42659		0.3 55
22		-29.4701	33.18761	-3.55166	-11.8279	4.541458		-(56
23		23.13343	-36.0754	[illegible]33	12.31233	-4.71656		-0. 56
24		4.100657	-2.10347	-11.9936	19.39448	-8.77[illegible]7		-0. 16
25		-11.1637	1[illegible]6	5.639092	-27.1902	13.89119		0.0 59
26								
27		ANS	a0=0.3[illegible]55					
28			a1=-0. [illegible]					
29			a2=-0[illegible]6					
29			a3=-0. .6					
31			a4=0.0[illegible]59					

Question 3. Plot the voltage as a function of time and use Newton's divided difference method to compute the voltage at t=3.145 sec from the following experimental data:

t(sec)	1	2	3	4	5	6
V(Volt)	9.4	7.31	5.15	3.55	2.81	2.04

Solution:

C28 {=C20+D20*(3.145-B20)+E20*(3.145-B20)*(3.145-B21)+F20*(3.145-B20)*(3.145-B21)*(3.145-



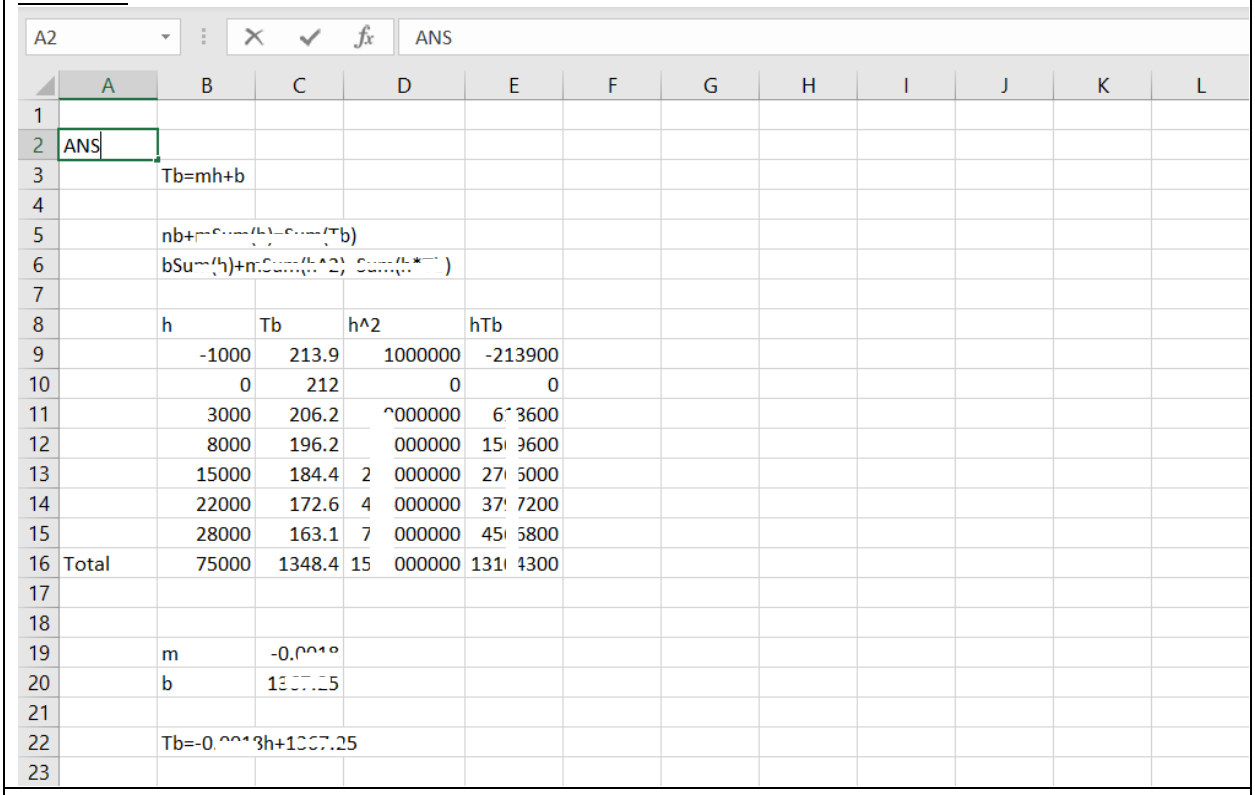
	A	B	C	D	E	F	G	H	I	J	K	L
1												
2		t	V									
3		1	9.4									
4		2	7.31									
5		3	5.15									
6		4	3.55									
7		5	2.81									
8		6	2.04									
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19		t	V	f1	f2	f3	f4	f5				
20		1	9.4	-[illegible]9	-0.0[illegible]5	0.1[illegible]5	-0.0[illegible]75	-0.0[illegible]17				
21		2	7.31	-[illegible]6	0.[illegible]3	0[illegible]5	-0.6[illegible]38					
22		3	5.15	[illegible]6	0.[illegible]3	-0.148[illegible]3						
23		4	3.55	-[illegible]4	-0.0[illegible]5							
24		5	2.81	-0.[illegible]7								
25		6	2.04									
26												
27												
28		V(3.145)	4.8[illegible]21									

Question 4: The boiling temperature of water T_B at various altitudes h is given in the following table.

h(ft)	-1,000	0	3,000	8,000	15,000	22,000	28,000
T (F)	213.9	212	206.2	196.2	184.4	172.6	163.1

(a) Compute the straight-line equation $T_B = mh + b$ that best fits the data.

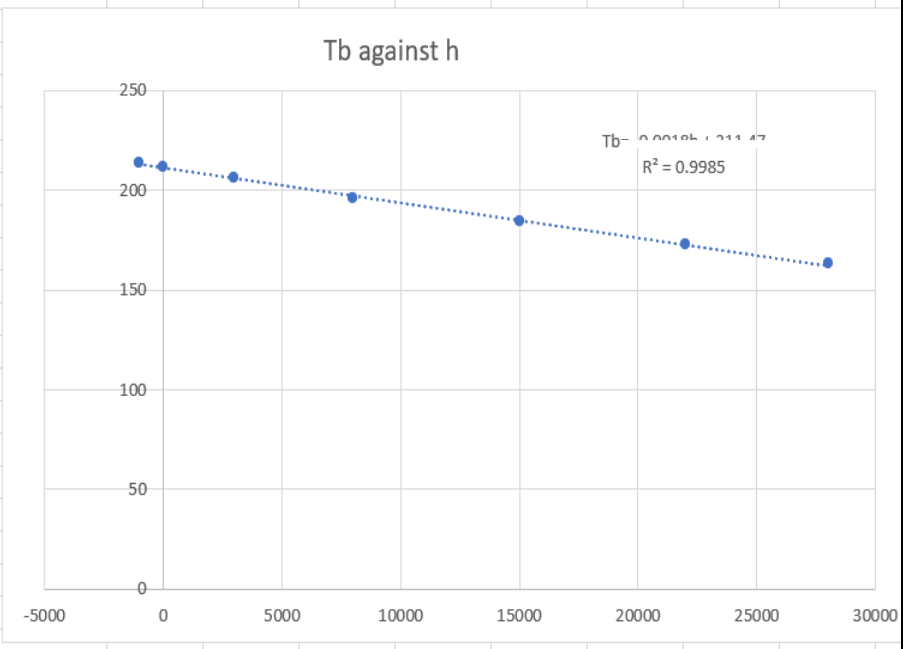
Solution:



(b) Use Excel's Add Trendline feature to find the straight line that best fits the given data.

Solution

24	ANS		
25		h	Tb
26		-1000	213.9
27		0	212
28		3000	206.2
29		8000	196.2
30		15000	184.4
31		22000	172.6
32		28000	163.1
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45		equation from excel trendline function	
46			
47		Tb=	
48			



(c) Use this linear equation for calculating the boiling temperature at 5,000 ft.

Solution

44			
45		equation from excel trendline function	
46			
47		Tb=	
48			
49	ANS	m=	
50			
51		b=211.17	
52			
53		h=5000	
54			
55		Tb	202.17
56			

THE END

THANK YOU!!!