

**Question 1**

$$f(x) = 3\sin^2(5x)$$

$$f'(x) = 30 \sin(5x) \cos(5x)$$

$$\frac{f(x)}{f'(x)} = \frac{\tan(5x)}{10}$$

xi	f(x)	f'(x)	εa
0.6	0.05974457	-4.19123	
0.614255	0.014810011	-2.10263	0.023206
0.621298	0.003694854	-1.05218	0.011337
0.62481	0.000923239	-0.5262	0.00562
0.626564	0.00023078	-0.26311	0.0028
0.627441	5.76932E-05	-0.13156	0.001398
0.62788	1.44232E-05	-0.06578	0.000698
0.628099	3.60579E-06	-0.03289	0.000349
0.628209	9.01447E-07	-0.01644	0.000175

xi	f(x)/f'(x)	εa
0.6	-0.01425465	
0.614255	-0.00704355	0.023206
0.621298	-0.0035116	0.011337
0.62481	-0.00175454	0.00562
0.626564	-0.00087711	0.0028
0.627441	-0.00043854	0.001398
0.62788	-0.00021927	0.000698
0.628099	-0.00010963	0.000349
0.628209	-5.4816E-05	0.000175

**Question 2**

x	y
1.2	-4.52
1.5	-3.2
1.8	-2.12
2.1	-0.38

$$x = 1.3$$

$$L_i f(x_i)$$

L0=	0.49382716	-2.2321
L1=	0.740740741	-2.37037
L2=	-0.2962963	0.628148
L3=	0.061728395	-0.02346

$$f(1.3) = -3.99777778$$

**Question 3**

	x	y	ln(y)	xln(y)	x <sup>2</sup>	SSE
	2.1	160	5.075174	10.65787	4.41	1.88332E-05
	2.3	225	5.4161	12.45703	5.29	0.088826246
	2.5	315	5.752573	14.38143	6.25	0.313618103
	2.6	374	5.924256	15.40307	6.76	0.002011293
	2.8	525	6.263398	17.53752	7.84	0.026768365
	3	738	6.603944	19.81183	9	0.237087564
	3.1	874	6.77308	20.99655	9.61	6.98022E-05
sum	18.4	3211	41.80853	111.2453	49.16	0.668400207

D= 1.697869878  
 ln(C)= 1.509674194  
 C= 4.525256198

**Question 4**

$$\int_{\frac{\pi}{3}}^{\frac{4\pi}{3}} \frac{\cos^2(x)}{1 + \sin(x)} dx$$

solution:  $y = x + \cos(x)$

$h = \pi/6 = 0.523598776$   
 $n = 6$

x	f(x)
1.047198	0.133974596
1.570796	1.87624E-33
2.094395	0.133974596
2.617994	0.5
3.141593	1
3.665191	1.5
4.18879	1.866025404

I=	2.141161059
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true value=	2.141592654
Et=	0.000431595
Et	0.00020153

**Question 5** DE midpoint

$$y^2 \frac{dy}{dx} - 5y^3 = e^{-2x} \quad y(0) = 2$$

$$\frac{dy}{dx} = 5y + \frac{e^{-2x}}{y^2} \quad y(0) = 2$$

Solution

$$y = \sqrt[3]{\frac{(139e^{15x} - 3e^{-2x})}{17}}$$

h= 0.05				
$x_i$	$y_i$	$f(x_i, y_i)$	$y_{i+1/2}$	$f(x_{i+1/2}, y_{i+1/2})$
0	2	10.25	2.25625	11.46810763
0.05	2.573405382	13.00366	2.898497	14.59493391
0.1	3.303152077	16.5908	3.717922	18.64595141
0.15	4.235449648	21.21854	4.765913	23.86059081
0.2	5.428479188	27.16514	6.107608	30.55513209
0.25	6.956235793	34.79371	7.826079	39.13981311

x=	0.15
true=	4.262509127
Et=	0.02705948
Et	0.006348251

**Question 6**

	form 1	form 2
1	A (2)	D (2)
2	B $(x_{i+1}=2x_i/3+5/(3x_i))$	C $(x_{i+1}=2x_i/3+5/(3x_i))$
3	D (None of the choices)	D (None of the choices)
4	A $(\lambda_1=5, \lambda_2=-1)$	B $(\lambda_1=5, \lambda_2=-1)$
5	C (0.35)	B (0.35)
6	B $(f(x)=x-2)$	D $(f(x)=x-2)$
7	C (2.4067)	A (2.4067)
8	A (1.25)	C (1.25)