1- False Position

$$f(x) = 4\,cos(x) - 0.5e^{3x}$$

iter	x_l	x_r	x_u	$f(x_l)$	$f(x_r)$	$f(x_u)$	E_a
1	0.5	0.569363	1	1.269486	0.609777	-7.88156	
2	0.569363	0.600288	1	0.609777	0.273258	-7.88156	0.030925
3	0.600288	0.613681	1	0.273258	0.118575	-7.88156	0.013394

2- Newton Raphson

$$f(x) = 10\sin(x^2) - 3$$

$$f'(x) = 20xcos(x^2)$$

iter	xi	f(x)	f'(x)	f(x)/f'(x)	ε_a
0	0.7	1.706259	12.35266	0.138129	
1	0.561871	0.104812	10.68206	0.009812	0.245837
2	0.552059	0.000732	10.53236	6.95E-05	0.017773
3	0.55199	3.72E-08	10.53129	3.53E-09	0.000126

4- Regression

	x	*y*	*ln(y)*	*xln(y)*	x^2	*SSE*
	3.1	5.5	1.704748	5.284719	9.61	0.004021
	3.6	7.1	1.960095	7.056341	12.96	0.068901
	4.2	8.6	2.151762	9.037401	17.64	0.024718
	4.8	10.8	2.379546	11.42182	23.04	0.172983
	5.3	14.2	2.653242	14.06218	28.09	0.172626
sum	21	46.2	10.84939	46.86247	91.34	0.44325

D= 0.412425
ln(C)= 0.437694
C= 1.549131

5- Lagrange Interpolation

x	f(x)
-2	24
0	2
1	3

$$f_2(x) = L_0 f(x_0) + L_1 f(x_1) + L_2 f(x_2)$$

$$L_0 = \frac{(x-0)(x-1)}{(-2-0)(-2-1)} = \frac{x(x-1)}{-2\times -3} = \frac{x^2-x}{6}$$

$$L_1 = \frac{(x--2)(x-1)}{(0--2)(0-1)} = \frac{(x+2)(x-1)}{2\times -1} = \frac{x^2+x-2}{-2}$$

$$L_2 = \frac{(x--2)(x-0)}{(1--2)(1-0)} = \frac{(x+2)x}{3\times 1} = \frac{x^2+2x}{3}$$

$$f_2(x) = \frac{x^2-x}{6}\times 24 + \frac{x^2+x-2}{-2}\times 2 + \frac{x^2+2x}{3}\times 3$$

$$f_2(x) = 4(x^2-x) - (x^2+x-2) + (x^2+2x)$$

$$f_2(x) = 4x^2 - 4x - x^2 - x + 2 + x^2 + 2x$$

$$f_2(x) = 4x^2 - 3x + 2$$

$$f_2(4) = 4\times 4^2 - 3\times 4 + 2 = 54$$

6- Simpson 1/3 Rule

$$\int_{\frac{\pi}{6}}^{\frac{5\pi}{6}} \cos^2(2x)\sin(x)\,dx$$

$$I = \frac{h}{3}\left[f(x_0) + 4\sum_{i=1,3,5}^{n-1} f(x_i) + 2\sum_{i=2,4}^{n-2} f(x_i) + f(x_n) \right]$$

$$y = -\cos(x) + \frac{4}{3}\cos^3(x) - \frac{4}{5}\cos^5(x)$$

n= 6 h= 2π/18= 0.349066

	x		f(x)
a=x_0	3π/18	0.523599	0.125
x_1	5π/18	0.872665	0.023099
x_2	7π/18	1.22173	0.551434
x_3	9π/18	1.570796	1
x_4	11π/18	1.919862	0.551434
x_5	13π/18	2.268928	0.023099
b=x_6	15π/18	2.617994	0.125

I= 0.772661

I_{true}= 0.779423

E_a= 0.006762

7- Huen

$$\frac{dy}{dx} = e^{-y}(x^2 - 6) \qquad y(3) = 0$$

$$y = ln(\frac{x^3}{3} - 6x + 10\ )$$

h= 0.12

iter	x_i	y_i	$f(x_i,y_i)$	y^0_{i+1}	$f(x_i,y^0_{i+1})$	TRUE	E_a
0	3	0	3	0.36	2.605402		
1	3.12	0.336324	2.667824	0.656463	2.332827	0.339166	0.002842
2	3.24	0.636363	2.380191	0.921986	2.103824	0.640489	0.004126

8- multiple choice

1	**A**
2	**C**
3	**B**
4	**D**
5	**A**
6	**C**