

Problem 1 (40 pts)

Consider the function $f(x) = x^3 - 4x^2 + 6x - 4$. Fill in the tables below and stop when the true relative error falls below 15% or after the fifth iteration, whichever comes first. Retain the maximum number of digits in all intermediate calculations; however round all displayed results in the tables to 3 places after the decimal point.

Show work for one iteration to receive partial credit!

A. Bisection Method

Iteration #	x_L	x_U	x_R	$ e_T , \%$
1	0.000	10.000		
2				
3				
4				
5				

B. False Position Method

Iteration #	x_L	x_U	x_R	$ e_T , \%$
1	0.000	3.000		
2				
3				
4				
5				

C. Simple One Point Iteration

$$x_{i+1} = g(x_i) \text{ where } g(x) = \underline{\hspace{10em}}$$

i	x_i	$ e_T , \%$
0	1.000	
1		
2		
3		
4		
5		

D. Newton Raphson Method

$$f'(x) = \underline{\hspace{10em}}$$

i	x_i	$ e_T , \%$
0	1.000	
1		
2		
3		
4		
5		

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EXAM 1

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Problem 2 (20 pts)

Consider the table of values obtained from an unknown function $f(x)$.

i	x_i	$f(x_i)$	Δ	Δ^2	Δ^3
0	0	0			
1	1	1			
2	2	2			
3	4	28			

- Find the coefficients b_0 , b_1 , b_2 , and b_3 in the Newton Divided Difference Interpolating polynomial $f_3(x)$. Use the table above and fill in the finite differences.
- Estimate the function at $x=3$.
- An additional data point from $f(x)$ is $x = 3$, $f(3) = 7$. Find the true error at $x=3$.

Problem 3 (40 pts)

- A) Estimate the weight of a 6 ft tall high school student using a least squares regression line thru the following data points.

Height (inches) H	Weight (ft) W
72	190
70	175
69	165
74	215
66	145
71	185
68	160

Hint: Use the following table to find the coefficients in the Normal Equations.

H_i inches	W_i lbs	$H_i W_i$	H_i^2	\hat{W}_i	$(W_i - \bar{W})^2$	e_i	e_i^2
72	190						
70	175						
69	165						
74	215						
66	145						
71	185						
68	160						
ΣH_i	ΣW_i	$\Sigma H_i W_i$	ΣH_i^2		$\Sigma (W_i - \bar{W})^2$		Σe_i^2

- B) Complete the table and compute the coefficient of determination.

Ans. A) $\hat{W}(72) =$ _____, B) $r^2 =$ _____

