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SHOW ALL WORK!

Problem 1 (25 pts)

Solve the following system of equations using the Gauss Jordan Elimination Method.

$$
\begin{array}{rcrcrcrcr}
a & + & b & + & c & + & d & = & 5 \\
2a & - & b & - & c & + & d & = & 25 \\
a & + & 3b & + & 2c & - & 4d & = & 0 \\
 & & 2b & - & 2c & + & d & = & 10
\end{array}
$$

$$
(A|\underline{b}) = \left[\begin{array}{cccc|c} 1 & 1 & 1 & 1 & 5 \\ 2 & -1 & -1 & 1 & 25 \\ 1 & 3 & 2 & -4 & 0 \\ 0 & 2 & -2 & 1 & 10 \end{array}\right] \approx
$$

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SHOW ALL WORK!

Problem 2 (25 pts)

Find the equation of the Least Squares line which best fits the hyperbola $y = 1/x$ over the interval (1,5). Do this by generating 5 equally spaced points over the interval (1,5) from the hyperbola. Find the sum of the squares of the residuals SSE. Round all calculations to 4 places after the decimal point.

i	x_i	$y_i = 1/x_i$
1	1	1.0000
2	2	
3	3	
4	4	
5	5	

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SHOW ALL WORK!

Problem 3 (25pts)

Consider the definite integral $I = \int_1^6 \frac{a}{x^2} dx$. Using Trapezoidal integration with a step size Δx=1 results in an approximate value I_T = 2.44375.

A) Find the value of "a".

B) Using the correct value of "a", apply Simpson's 1/3 Formula with Δx=5/6 and find I_S, the approximation to the definite integral.

C) Find the true relative error in Parts A) and B).

i	x_i	$f_i = \frac{a}{x_i^2}$
0		
1		
2		
3		
4		
5		

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SHOW ALL WORK!

Problem 4 (25pts)

Using Trapezoidal integration to approximate the definite integral

$$I = \int_0^4 \sin x dx$$

it is necessary to keep the truncation error below 2.854785×10^{-8}. Find the number of required sub-intervals from 0 to $\pi/4$.