

DO ANY 4 PROBLEMS

Problem 1 (25 pts)      Grade: Y\_\_\_\_, N\_\_\_\_

The following data points are to be approximated by a straight line:

$x_i$	0	1	1	2	3
$y_i$	0	1	2	3	3

- A) Find the equation of the Least Squares regression line thru the data points.
- B) Using the line  $y = x$  (not the Least Squares line) for interpolation, find the coefficient of determination  $r^2$ .

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EXAM 2

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Problem 2 (25 pts)    Grade: Y\_\_\_\_, N\_\_\_\_

For the system of equations below:

$$\begin{array}{rcccccc} x & + & y & - & 2z & = & 0 \\ 2x & + & ky & + & z & = & -3 \\ x & - & 2y & + & z & = & 0 \end{array}$$

- A) Find the value of  $k$  for which the equations do not have a unique solution.
- B) Use the Gauss-Jordan Elimination Method, starting with the augmented matrix  $(A|b)$  to find the solution when  $k=0$ .

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EXAM 2

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Problem 3 (25 pts)    Grade: Y\_\_\_\_, N\_\_\_\_

Estimate the function  $f(x) = e^x$  at  $x=1$  by fitting a 3rd order Newton Divided Difference polynomial thru the four points:

$(0, e^0)$ ,  $(0.5, e^{0.5})$ ,  $(1.5, e^{1.5})$  and  $(2, e^2)$ .

Express the coefficients  $b_i$ ,  $i=0,1,2,3$  to five places after the decimal point and use them to estimate  $f(1)$ .

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EXAM 2

Name \_\_\_\_\_

Problem 4 (25 pts)    Grade: Y\_\_\_\_, N\_\_\_\_

A Lagrange polynomial of order 3, i.e.  $f_3(x)$ , is needed to pass thru the points:

(0,0), (1,1), (2,8), and (4,64). What is the value of  $f_3(3)$ ?

Problem 5 (25 pts) Grade: Y\_\_\_\_, N\_\_\_\_

Use Trapezoidal Integration with n=5 intervals to estimate the definite integral

$$I = \int_0^1 x^3 dx$$

Let the result be called  $I_5$ . Repeat the process using m=10 intervals with  $I_{10}$  as the result. Use the results for  $I_5$  and  $I_{10}$  to obtain an improved estimate of  $I$ , called  $I_{5/10}$ . Round all intermediate and final calculations to 5 places after the decimal point.

i	$x_i$	$f_i = f(x_i)$
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		