Practice exam for Mech 105

1. (Based on 5.7) Use the bisection method to get an accuracy of 5% for the equation

x^3-3\*x^2+2\*x+2 (hint: start with the upper bound of 0 and a lower bound of -1):

1. Use the Newton-Raphson method to determine the root of 3\*x^3-x^2+7\*x+2. Try to get a 5% accuracy and start with an x0=2.
2. (Based on 10) Use LU factorization to determine the constants.

3\*x+4\*y+z= 11

-2\*y+3\*z+7\*x= 17

6\*y+5\*x-4\*z= -3

1. Use the table to estimate the interval of f(x) from 0 to 1.4. (Hint: Use Simpson’s 1/3 rule)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 0 | 0.2 | 0.4 | 0.6 | 0.8 | 1.0 | 1.2 |
| 2 | 4.68 | 7.12 | 9.32 | 11.28 | 13 | 14.48 |

1. Now do the same thing but this time use Simpson’s 3/8ths rule and trapezoidal rule.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 0 | 0.2 | 0.4 | 0.6 | 0.8 | 1.0 | 1.2 |
| 2 | 4.68 | 7.12 | 9.32 | 11.28 | 13 | 14.48 |

1. Evaluate -3\*x^2+14\*x+2 using the two-point Gauss quadrature formula.
2. The last 3 question all used the same formula. The actual value under the integral is 10.752. Which method is the most precise?
3. Change binary into decimal.
   1. 10001
   2. 1101.101

Extra credit:

01111001 01101111 01110101 00100000 01100001 01110010 01100101 00100000 01101011 01101001 01101100 01101100 01101001 01101110 01100111 00100000 01101101 01100101 00100000 01110011 01101101 01100001 01101100 01101100 01110011 00100000

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |