4 individual task in calculus:

Edited at 10am 4 June 2018.

s is your student number. k = s mod 10000. T = s mod 100. m = s mod 35. a = s mod 25.

L = s mod 10. . e = s mod 8. m7 = s mod 7. m6 = s mod 6. m5 = s mod 5. m4 = s mod 4.

m3 = s mod 3. m2 = s mod 2. u = s + 10000.

1. Solve y´ = y/T, y(0) = 1/k using m2 + 2 unitary steps. Calculate error.

1.2. Calculate the error of your Euler method.

2. Heaviside method:

L1 = L

m1 = m

n1 = s

a1 = a

b1 = T

c1 = e

3. Determine the type of the partial differential equation.

m2 = 0: -6Hxx + 7Hxt – 5Htt +675Hx – 34Ht + 54356 = 0

m2 = 1: 39Hxx + 23Hxt – 305Htt - 6567Hx +56465Ht - 67467 = 0

, curl V = , div V =. , grad S =

4.

m5 = 0: Explain Nabla operator.

m5 = 1: Explain divergence.

m5 = 2: Explain curl.

m5 = 3: Explain gradient.

m5 = 4: Explain Maxwell Equations.

5. Calculate

m3 = 0: curl(grad)

m3 = 1: div(curl)

m3 = 2: div(grad)

**i, j, k** are unitary vectors along x, y and z respectively.

6. Find these dot-products and corresponding cross-products:

m4 = 0: **ij** =

m4 = 1: **jj** =

m4 = 2: **kj** =

m4 = 3: **ki** =

7. Find these cross-products.

m4 = 0: **i×j** =

m4 = 1: **j×j** =

m4 = 2: **k×j** =

m4 = 3: **k×i**=

8. Calculate

9. Find T! and T-th Fibonacci number.

http://mathworld.wolfram.com/GammaFunction.html

https://en.wikipedia.org/wiki/Fibonacci\_number

**Linear approximation:**

10. Calculate using linear approximation.

11. Calculate Riemann sum for integral

for T intervals.

**Truncation error:**

12. Perform errors analysis for the linear, quadratic, and cubic approximations for (1+1/T)6.

**Error bounds for integration:**

13. Perform the errors analysis for the integral error bounds for x6 @[0, 1] taking 2T intervals.

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/error4bounds4integration.docx

14. Explain the integration error bounds:

m4 = 0: Left and right rectangles

m4 = 1: Mid-rectangles

m4 = 2: Trapezoidal rule

m4 = 3: Simpson rule

15. How many petals are there in the flower R = cos(TA)?

16. Plot the graphs in polar coordinates and parametric curves.

m4 = 0: R = Acos(A)

m4 = 1: R = Asin(A)

m4 = 2: x = cos(t)sin(t), y = cos(t)

m4 = 3: x = Sin(t), y = tCos(t)

17. Prove the Jacobian expression. 4. Solve the optimization problems.

m3 = 0: Polar coordinates.

m3 = 1: Cylindrical coordinates.

m3 = 2: Spherical coordinates.

18.

m4 = 0: Explain curvilinear coordinates.

m4 = 1: What are polar coordinates?

m4 = 2: Explain cylindrical coordinates.

m4 = 3: What are spherical coordinates.

19. Find the discriminant of the elliptic curve y2 = x3 + Lx + T. Give the properties of your elliptic curve. Find x for y = 0 at your elliptic curve.

20. Try to apply for all grants, scholarships, fellowships, etc. in embassies of USA, Canada, Europe, Australia, Japan, etc.

Project:

21. Improve your project.

Deadline is 30.6.2018.