3 group task in calculus:

Edited at 9am 21.5.2018.

1. Explain series convergence tests.

https://en.wikipedia.org/wiki/Convergence\_tests

2. What is truncation error?

3. Give the main numerical integration equations.

4. Explain the main integration error bound equations.

5. What is Euler method for numerical solving of differential equations?

https://en.wikipedia.org/wiki/Numerical\_methods\_for\_ordinary\_differential\_equations

6. Explain quaternion.

https://en.wikipedia.org/wiki/Quaternion

Optimization or application of derivative:

Analyze the number of layers for the optimal configuration.

7. Find the largest area rectangle with perimeter of 99.

8. Find the largest volume cylinder with surface area of 99.

9. Find the largest volume cone with surface area of 99.

10. Find minimum initial velocity and corresponding angle of release to hit the top corner of soccer goal

(3 – 1/99 by 8 – 1/99 meters) from penalty spot 11 – 1/99 meters from the goal.

https://calculus12s.weebly.com/uploads/2/5/3/9/25393482/projectile16.docx

https://calculus12s.weebly.com/uploads/2/5/3/9/25393482/minimum4velocity4projectile4angle.txt

https://calculus12s.weebly.com/uploads/2/5/3/9/25393482/velocity4minimum4projectile.txt

**Application of integrals:**

11. Calculate area bellow the curve f(x)=1+cos(99x)@[1/999,1/99].

12. Calculate area between the curves f(x)=1+cos(99x) and g(x)= 1+sin(99x)@[1/999,1/99].

13. Calculate average value, center of mass and moment of inertia of f(x)=1+cos(99x)@[1/999,1/99].

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/average\_value\_of\_continuous\_function.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/center\_of\_mass.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/y\_center\_of\_mass.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/curves\_center\_of\_mass.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/moment\_of\_inertia.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/x\_curves\_moment\_of\_inertia.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/y\_curves\_moment\_of\_inertia.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/corrected\_averages\_centers\_massess\_inertia\_moments.jpg

http://www.integral-calculator.com/

14. Find arc length of f(x)

a. -0.006x2+0.3x@[1/999,11-1/99],

b.1+cos(99x)@[1/999,1/99], c.x2@[0,99].

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/arc1.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/arc2.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/arc3.txt

http://www.integral-calculator.com/

15. Calculate revolutionary volume and surface area of f(x) = 1 + cos(99x) @ [1/999, 1/99].

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/volume\_of\_revolution.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/surface\_of\_revolution.txt

http://www.integral-calculator.com/

Differential equations:

Solve these differential equations:

Ordinary differential equations:

16. y' = 99y

17. 99y'' + 35y' + 10y = 0

18. 99y'' + 35y' + 10y = sin(999x + 25)

http://www.wolframalpha.com/widgets/view.jsp?id=e602dcdecb1843943960b5197efd3f2a

19. Solve the differential equation for projectile for angle of release of 77 degrees and initial velocity of 77 meters per second.

Partial differential equations:

20. Solve heat equation for v = 99.

21. Solve wave propagation equation for v = 99.

Series:

22. Two computer companies make computers whose power increases: the first computers increase their power 2% every two years and the second 1% every year. Which computer power grows faster? Why?

23. What gives the greater value 0.1% decay in 2 years or 0.05 % every year? Why?

24. What is the hangover of *999* meter blocks?

25. Expand sin(99x) in the Taylor Series around 0.

Take only terms 0, 1, 2, 3, 4.

26. Expand f(x) = *99* in the Fourier Series. Take only terms 0, 1, 2, 3, 4.

27. Calculate the Inner Product of sin(*25*x) and cos(*35*x) at [0, 1].

**Orthogonal polynomials:**

28. Expand sin(*99*x) in Legendre polynomial series.

Take only terms 0, 1, 2, 3, 4.

29. Give the orthogonal polynomials number 10.

https://en.wikipedia.org/wiki/Orthogonal\_polynomials

Fractals:

30. Draw fractal.

https://www.wolframalpha.com/examples/math/geometry/fractals/

31. Solve Jindoh Riddle problem.

http://dishonored.wikia.com/wiki/The\_Jindosh\_Riddle

Predictions:

32. Predict results of soccer world cup and Indonesian elections of 2018.

http://www.fifa.com/worldcup/

https://en.wikipedia.org/wiki/Indonesian\_local\_elections,\_2018

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

Deadline is 31.5.2018.