**5 group task in calculus:**

Edited at 4pm 16.1.2018.

1. How many petals are there in the flower R = cos(100A)?

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

R = Acos(A)

R = Asin(A)

x = cos(t)sin(t), y = cos(t)

x = Sin(t), y = tCos(t)

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

Polar coordinates.

Cylindrical coordinates.

Spherical coordinates.

3.2.

Explain curvilinear coordinates.

What are polar coordinates?

Explain cylindrical coordinates.

What are spherical coordinates.

3.3. Solve the optimization problems.

100 = Perimeter for rectangle, right angled triangle, and arbitrary triangle. Find maximum area.

100 = Surface Area of the cylinder. Find maximum volume.

Find minimum velocity of projective to reach the point (100,10) and find the corresponding angle of release.

5. Are the points (1,7),(-2,87),(9,-3) collinear?

6. Solve y´ = y/100, y(0) = 1/9000 using 3 unitary steps.

7. Solve y´´ + y´/999999 + 99999y = 99sin(999x + 8), y(0) = 0, y´(0) = 1.

8. Solve the Heaviside method problem.

L1 = 1

m1 = 2

n1 = 3

a1 = 4

b1 = 5

c1 = 6

Find antiderivative of f(x).

9. Calculate the improper integrals.

10. Find 100! and 100-th Fibonacci number.

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

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

11. Calculate using linear approximation.

12. Perform errors analysis for (1+1/100)6.

13. What is the hangover of 18000000 meter blocks?

14. Calculate the number series sums.

a. b. c.d.e.f.g.h. i.

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http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/alternating2harmonic2series.txt

http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/harmonic4series.txt

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http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/inverse6powers.txt

15. Find

16. Calculate

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

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

19. Calculate the Inner Product of sin(x) and cos(x) at [0, 1].

20. Expand sin(x) in Legendre polynomial series.

21. Give the orthogonal polynomials number 10.

22. Calculate area bellow the curve f(x)=1+cos(x)@[0,1].

23. Calculate area between the curves f(x)=1+cos(x) and g(x)= 1+sin(x)@[0,1].

24. Calculate average value, center of mass and moment of inertia of f(x)=1+cos(x)@[0,1].

25. Calculate revolutionary volume and surface area of f(x) = 1 + cos(x) @ [0, 1].

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

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

25.2. Find arc length of f(x)

a. -0.006x2+0.3x@[0,11],

b. 1+cos(x)@[0,1],

c. x2@[0,1].

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/

25.3. Calculate Riemann sum for integral

for 99 intervals.

26. Perform the errors analysis for the integral error bounds for x6 @[0, 1] taking 200 intervals.

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

26.2. Explain the integration error bounds:

Left and right rectangles

Mid-rectangles

Trapezoidal rule

Simpson rule

26.3. For what x is e10x = 0.5?

26.4. For what x is e10x = 0?

26.5. Two computer companies make computers whose power increases: the first computers increase their power 200% every two years and the second 100% every year. Which computer power grows faster? Why?

27. What gives the greater value 10% decay in 2 years or 5% every year?

28. Calculate logistic function P(t) for i = 1 and R = t = M = 2.

28.2. Find inflection point of your logistic function for

i = 1 and R = t = M = 2.

https://www.symbolab.com/solver/function-inflection-points-calculator

https://www.wolframalpha.com/input/?i=inflection+points+e%5Ex%2F(e%5Ex%2B1)

28.3. Compare 9999999999 and (99999+1)99999-1.

28.4. Find the discriminant of the elliptic curve y2 = x3 + 10x + 100. Give the properties of your elliptic curve. Find x for y = 0 at your elliptic curve.

28.5. Find maxima, minima, inflections of the elliptic curve y2 = x3 + 10x + 100.

28.6. Find maximum area rectangle with perimeter = 100.

28.7. Use the quantum computer.

https://www.research.ibm.com/ibm-q/

29. Solve the Zimmermann problem.

http://azspcs.com/

Deadline: January 2018.