2 individual task in calculus:

Edited at 8am 22.4.2018.

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. $d\_{2}=\frac{T-L}{10}$. 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.

Optimization or application of derivative:

Analyze the number of layers for the optimal configuration.

1. Find the largest area rectangle with perimeter of T.

2. Find the largest volume cylinder with surface area of T.

3. Find the largest volume cone with surface area of T.

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

(3 – 1/T by 8 – 1/T meters) from penalty spot 11 – 1/T 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:**

5. Calculate area bellow the curve f(x)=1+cos(Tx)@[1/s,1/k].

6. Calculate area between the curves

f(x)=1+cos(Tx) and g(x)= 1+sin(Tx)@[1/s,1/k].

7. Calculate average value, center of mass and moment of inertia of f(x)=1+cos(Tx)@[1/s,1/k].

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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

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

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

8. Find arc length of f(x)

a. -0.006x2+0.3x@[1/s,11-1/k],

b. 1+cos(Tx)@[1/s,1/k],

c. x2@[0,T].

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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/

9. Calculate revolutionary volume and surface area of

f(x) = 1 + cos(Tx) @ [1/s, 1/k].

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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:

10. y' = Ty

11. Ty'' + my' + Ly = 0

12. Ty'' + my' + Ly = sin(kx + a)

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

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

**Logistic function, Logistic growth, Learning curve:**

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

$$P(t)=\frac{Mie^{Rt}}{M+i\left(e^{Rt}-1\right)}$$

15. Find inflection point of your logistic function for

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

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

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

Partial differential equations:

16. Solve heat equation for v = T.

17. Solve wave propagation equation for v = T.

Series:

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

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

20. What is the hangover of *s* meter blocks?

21. Calculate

a.$\sum\_{c=1}^{T}\frac{(-1)^{c}}{c}$ b.$\sum\_{c=1}^{T}\frac{1}{c}$ c.$\sum\_{c=1}^{T}c^{-4} $d.$\sum\_{c=1}^{T}c^{-6} $e.$\sum\_{c=0}^{T}b^{c} $f.$\sum\_{c=1}^{T}c^{-2} $g.$\sum\_{c=1}^{T}c^{-3} $h.$\sum\_{c=0}^{T}\frac{(-1)^{c}}{2c+1}$ i.$\sum\_{c=1}^{T}c^{-5}$

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http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/inverse3powers.txt

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http://calculus12s.weebly.com/uploads/2/5/3/9/25393482/inverse5powers.txt

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

22. Find $\sum\_{c=0}^{\infty }T^{-c}$

23. Find the convergence radius and the sum.

$$\sum\_{c=0}^{\infty }\left(Tx\right)^{c}$$

24. Calculate $\sum\_{c=0}^{\infty }C(p,c)\left(Tx\right)^{c}$

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

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

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

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

**Orthogonal polynomials:**

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

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

29. Give the orthogonal polynomials number L.

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

Fractals:

30. Draw fractal.

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

Predictions:

31. 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

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

Project:

33. Improve your project.

Deadline is 30.4.2018.