C individual calculus task:

Edited at 9am 3 April 2017.

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. m4 = s mod 4. m3 = s mod 3.

Differential equations:

1. Solve the differential equation.

Ty'' + my' + Ly = kCos(x)

**Logistic growth:**

2. Find y in logistic growth for ymin = *a*, ymax = *99(m+1)*, R = *m3*, time x = *m3*.

**Geometrical Transformations:**

3. Express the translation *k* units right and *–T* units up.

4. Give the equations for the enlargement *T* times around the center of the enlargement (*L,a*).

5. Express the stretch *T* times for the stationary line y = *k*x+*m*.

6. Give the equations for the rotation around (*L,a*) by *T* dgrees.

7. Express the reflection with respect to the line y = *k*x+*m*.

**Normal Distribution:**

8. Write the expression for the Normal Distribution with the mean of *m* and the standard deviation of *d2*.

**Least squares regression:**

9. Perform the linear least squares fitting of these points (*L, a*), (*m, k*) and (*T,* $d\_{2}$). Use vertical offsets and the fitting line in the form y(x) = gx + i. Find the Hessian. Prove the minimum.

Check if for any 3 points (x1,y1), (x2,y2), (x3,y3), which are not on the same straight line,

$$g=\frac{3\left(x\_{1}y\_{1}+x\_{2}y\_{2}+x\_{3}y\_{3}\right)-(x\_{1}+x\_{2}+x\_{3})(y\_{1}+y\_{2}+y\_{3})}{3\left(x\_{1}^{2}+x\_{2}^{2}+x\_{3}^{2}\right)-(x\_{1}+x\_{2}+x\_{3})^{2}}$$

$i=\frac{y\_{1}+y\_{2}+y\_{3}-g(x\_{1}+x\_{2}+x\_{3})}{3}$.

Find the correlation.

**Correlation:**

10. Find the correlation coefficient for ($d\_{2}$,L),(a,T),(n,m),(k,m).

**Catenary or Chain Line:**

11. Find the equation of a massless cord fixed at the height of *T meters* supporting massive bridge of *k meters* in length with the lowest height in the middle of *0.001T meters*.

Creativity questions:

Music:

12. What is your favorite music? Why? How to create the best music?

https://www.youtube.com/watch?v=tj4LHB93O6o

https://www.youtube.com/watch?v=DUmq1cpcglQ

http://www.youtube.com/watch?v=tRokS74dbuA

https://www.youtube.com/watch?v=0sB3Fjw3Uvc

https://www.youtube.com/watch?v=oN86d0CdgHQ

https://www.youtube.com/watch?v=N6voHeEa3ig

https://www.youtube.com/watch?v=5O88XmgHhrU

https://www.youtube.com/watch?v=PWgvGjAhvIw

https://www.youtube.com/watch?v=DzwkcbTQ7ZE

Country:

13. What is the best country for you? Why?

Government:

14. What is the best government for you? Why?

Elections:

15. Predict April 2017 Jakarta governor elections results.

https://en.wikipedia.org/wiki/Jakarta\_gubernatorial\_election,\_2017

Games:

16. Join Dota2 gaming competition.

http://www.dota2.com/international/overview/

Project:

17. Improve your project.

Write the proposal.

Prepare to present your project to a native English speaking doctor of science.

Deadline: 8 April 2017 Saturday.