***Preliminaries***

The solutions to the assignments involving R coding should be reported in details, all R code that you write should be **included** into the report. Also, all appropriate pictures or diagrams should be included.

***Assignment 1: Be careful with ‘==’***

A pupil of a school is bad in arithmetic but good in programming. He writes a program to check if 1/3-1/4==1/12:

x1<-1/3;

x2<-1/4;

if (x1-x2==1/12){

print("Teacher said true")

} else{

print("Teacher lied")}

1. Check the result of this program. Comment why this happened.
2. Specify how the program can be modified to give a correct result

***Assignment 2: Derivative***

A widely known way to compute the derivative of function *f(x)* in point *x* is to use

1. Write your own function computing the derivative of function *f(x)=x* in this way. Take ε=10-15
2. Compute your derivative function at point x=100000.
3. What is the value you obtained? What is the real value of the derivative? Explain the reason behind the discovered difference

***Assignment 3: Variance***

A known formula for estimating variance is

1. Write your own function *myvar* estimating variance in this way
2. Generate vector x with 10000 random numbers, normally distributed with mean 108 and variance 1
3. For each subset Xi= {x1…xi}, i=1…10000 compute difference Yi= myvar(x)-var(x), where var(x) is a standard variance estimation function in R. Plot the dependence Yi on Xi. Draw necessary conclusions. How well your function works? What is the reason behind such behavior?

***Assignment 4: It’s learning***

The main objective of this assignment is to make you acquainted with the general workflow in the basic instruments in It’s learning.

### Why It’s Learning?

We use It’s learning because it is a smart system for organization of the course and also convenient for communicating between teacher and students.

### Log in to It’s learning

Go to <http://www.student.liu.se/portal/> and use your Liu-ID to log in.

### Change language

Click on tab ‘Mina inställningar’, and then ‘Anpassa It’s Learning’ and then ‘Välj språk’ as ‘English’. Click button ‘Spara’

Now navigate to the course page via Shortcuts

### Observe the catalog structure

*Course Information* contains general information about the course and the course schedule.

*Lectures* contains PPT-files with course lectures

*Labs* contains lab assignments

*Seminars* is used for uploading reports of opponent group for discussion at seminars.

*Examination* contains examination tasks

**Download the PPT-file of the first lecture**

Click *Lecture, Lecture 1 and then Lectures, Lecture 1a,* and then *Download Lecture 1*a. Save it to your local drive.

**Send in the solution to the assignment**

Click *Labs*, choose *Lab 1* and then click ‘*Submit answer*’ button.

Attach your doc-file with lab solution. Click ‘*Submit answer*’

**Send a message to the course leader**

Click *participants* in upper left menu and then click the hyperlink on the name of course leader. Click ‘*Send message*’ and inform that you have sent in the doc-file. After some minutes, check your mailbox which is available at ‘Messages’ tab and find the confirmation letter from the course leader. This is done for studying purposes only, in principle you don’t need to do that when you send in solutions to labs.

**Put your file in the Seminars catalog**

Go to Seminars -> Lab 1 and put the file you have sent via button ‘Add’. Choose Active property as ‘Set time span’ and set the time for activation as 10 minutes after the current time.