

# CS3113, Fall 2008, Assignment 1

Due September 15, 2008 (before start of class)

For this assignment, you cannot discuss any part with anyone else. You need to work all by yourself. Each problem should be done in a separate script file. Key results must be displayed. Any comments must also be displayed as a message.

For example, if your last name is Bush, then you must name the file for homework 1 problem 3 as BushHW01P01.m. Submit them using the electronic dropbox in Blackboard.

## Problem 1

An object is acted on by two external forces

$$\mathbf{F}^{(1)} = \begin{bmatrix} -3 \\ 1 \\ 2 \end{bmatrix}$$

and

$$\mathbf{F}^{(2)} = \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix}.$$

Compute the net force,  $\mathbf{F}$ , exerted on the object (compute the resultant vector). What is the magnitude of the resultant force? Compute it using only arithmetic operations and the `sqrt` function.

## Problem 2

Write a script to obtain a graph of the function

$$f(t) = e^{10t(t-1)} \sin(12\pi t),$$

for  $t$  ranging from 0 to 1. The distance between 2 adjacent values of  $t$  should be 0.003. Use the `length` function to display the total number of data points, and do not use `ezplot`.

### Problem 3

MATLAB's random number generator is discussed on p.328-331 of our textbook. In particular find out how to set the seed of the generator using the function `rand('state', n)` where `n` is an integer specifying the state of the generator.

Write a script to set the seed to a state given by 7. Create a column vector `RandVec1` containing 5 random numbers.

Without altering the seed, create another column vector `RandVec2` containing also 5 random numbers. Compare this vector with the previous one.

Now reset the seed to a state given by 7. Create a row vector `RandRowVec3` containing 11 random numbers. Comment on the result that you get.

Take 2 times `RandVec1` and add it to `RandVec2` to create a vector `Vec1`.

Compute vector `Vec2` as the element-wise product of `RandVec1` and `RandVec2`.

Compute vector `Vec3` as the element-wise division of the elements of `RandVec1` by those of `RandVec2`.

Compute the dot-product (scalar product) of `RandVec1` and `RandVec2` without using a loop or any built-in MATLAB functions. Assign the resulting value to an appropriately named variable. Hint: use matrix multiplication.

### Problem 4

Suppose in writing a computer game, one wants to create a sequence of integers that are randomly chosen from the closed interval `[lower upper]`, where `lower` and `upper` are two given integers with `lower` smaller than `upper`. Each point in this interval has exactly the same chance to be picked to form the sequence. Create a vector of these random integers containing  $n$  elements. You should use  $n = 10$ , `lower = 3` and `upper = 7`.