

CS1115 Lab 8 (October 24, 2013)

Completing the lab is very important, but your work is not graded and it is not submitted. If you finish before the hour is over, then you can leave early or you can work on the "Finished Early" problems. If you do not finish the problems before the end of class, then be sure to ask enough questions so that you can complete the exercises in the next day or two on your own.

1. Normalizing a Matrix

Write a script that uses `randn` to generate a 10-by-5 random matrix **A** and then computes another 10-by-5 matrix **B** with the property that $b_{ij} = (a_{ij} - \mu_j)/\sigma_j$ where μ_j is the average of all the entries in column j and σ_j is their standard deviation. Recall that the standard deviation of a length- n vector x is given by

$$\sigma = \sqrt{(x_1 - \mu)^2 + \dots + (x_n - \mu)^2} \quad \mu = (x_1 + \dots + x_n)/n$$

2. Largest Entry

By making effective use of the built-in function `max`, implement

```
function [i,j] = Max2(A)
% A is an m-by-n matrix
% |A(i,j)| >= |A(p,q)| for all p and q that satisfy 1<=p<=m and 1<=q<=n
```

Try it out on `randn(m,n)` for small m and n .

3. Digits

Download the function `DigitsPlay` from the syllabus page. Run it. (a) Modify it so that it prints out the digits upside down. (b) How many times do each of the 35 light bulbs switch state when 10000 random digits are displayed in succession? Modify `DigitsPlay` to answer this question.

4. Finished Early?

Write a function `MyMagic(n)` that it does the same thing as the built-in function `magic(n)` assuming that n is odd.

```
>> A = magic(5)
```

A =

```
17    24     1     8    15
23     5     7    14    16
 4     6    13    20    22
10    12    19    21     3
11    18    25     2     9
```

In general, `magic(n)` is an n -by- n matrix made up of the first n^2 integers with the property every row, column, and diagonal adds up to the same thing. If $n = 5$, then the "magic sum" is 65. Starting with a "1" in the middle of the top row, the "fill-it-in" process keeps moving "northeastward" unless it is "blocked" or falls off the top or right edge. Take it from there!

Please delete your files from the computer before you leave the lab!