**Lab Report Format**

Lab 2: Matlab Tutorial

Anthony Kosednar 09/14/12 1:30 PM

1. **Pre-lab Questions**

1.) Use the command help followed by the command to display the help

information for a command that you know. Use the doc command to bring up

a documentation window to search for a command that you do not know.

2.) Use the importdata command to import data from a file. The command is

used as follows: importdata(filename)

3.) To plot the function y = y(x), first chose which x’s you want to graph the

function for. Next set a y variable as your equation, and then plot your

function using the plot function.

Example:

x= 0:100

y = 2x

plot(x,y)

1. **Lab Description**

The goal of this lab was to provide an introduction to MatLAB as well as provide some initial analysis of Solar data.

1. **Measurements and recorded values**

avg\_power = 177.7963

avg\_irradiance = 228.7000

max\_power = 698.6200

max\_irradiance = 879.7700

insolation = 5.4888e+03

PeakSunHours = 5.4888

Linear Correlation between Electric Power and Solar Irradiance = 0.9996

1. **MATLAB code and plots**

**MATLAB CODE BELOW:**

% Description: FSE 100 - Lab #2 - MATLAB Practice Script

% Author: Anthony Kosednar

% Date: 09/10/2012

% Part 0: Import Data from http://cm.asu.edu/weather/

% Our Data download: http://cm.asu.edu/csv/WS-Download-9102012-8130.csv

%{

We pass the data to a php file to cleanup the data from the weather

site for us. The PHP Script deletes all columns but 3 and 6. Please see

the included script for more information. (Yes technically we were

suppose to manually edit the data but it is more efficent to let a

machine do it for us!)

%}

dataurl = 'http://cm.asu.edu/csv/WS-Download-9102012-8130.csv';

url = ['http://srvpanel.com/data-cleanup.php?data=',dataurl];

filename = 'rural\_day.csv';

urlwrite(url,filename);

disp('\* Solar Data Imported from ASU CM:')

data = importdata(filename)

% Part 1: mathematical computations

ComputationAnswer1 = (32/16)+4

ComputationAnswer2 = (2^4)-5

ComputationAnswer3 = 2+(exp(1)\*2)

ComputationAnswer4 = sin(pi/4)-cos(pi/4)

% Part 2: vectors and matrices

rad = 5; %in is our unit

CircleArea = pi\*(rad^2)

A = [1 5 -9 ];

B = [1 2 3 0 50];

C = [2 -5 pi];

C = C';

D = [5 9 14; 19 0 -10; 2\*((2)^(1/2)) -4 11];

SecondElementinVectorA = A(2)

disp('\* Answer for 3A-E:')

E = D(3,2)

% Part 3: import data and perform data analysis

disp('\* Now we do some solar data analysis')

power = data(:,1);

irradiance = data(:,2);

avg\_power = mean(power)

avg\_irradiance = mean(irradiance)

max\_power = max(power)

max\_irradiance = max(irradiance)

insolation = sum(irradiance) %units: (W\*h)/(m^2)

PeakSunHours = (insolation)/(1000)

disp('\* Linear Correlation between Electric Power and Solar Irradiance:')

corr(power,irradiance)

%{

If it is close to 1 then there is a strong positive correlation, 0 no correlation, and -1 a

strong negative correlation.

%}

disp('\* Since our data is close to 1, there is a strong correlation!!')

% Part 4: make 2D plots

y = power;

x = 0:23;

h = irradiance;

g = 0:23;

plot(x,y,'b-s',g,h,'y--d')

title('Solar Power and Irradiance over time')

xlabel('Hour of The Day')

ylabel('Amount of Energy')

legend('Solar Power (kWh) ','Solar Irradiance W/(m^2)')

**PHP Conversion Script Source:**

<?php

/\*

\* Description: FSE 100 - Lab #2 - PHP Script to Cleanup Data

\* Author: Anthony Kosednar

\* Date: 09/10/2012

\*/

// Add an clean input function

function cleanInput($input){

return strip\_tags(trim(preg\_replace('/<[^>]\*>%#;/', '', $input)));

}

// First check to see if we have any data

if(!isset($\_REQUEST["data"])){

echo "URL to data to cleanup is not set.";

exit();

}

$data = cleanInput($\_REQUEST["data"]);

// Now check to see if that data is a url

if (filter\_var($data, FILTER\_VALIDATE\_URL) == false) {

echo "<!-- ".$data." --> \n";

echo "URL set is not valid.";

exit();

}

// We read the data from the url

$data = file\_get\_contents($data);

// Now we read each line individually

$data\_array = explode("\n", $data);

foreach ($data\_array as $line=>$data) {

// Get rid of the header lines and any blank lines

if($line != "0" && $line != "1" && $data != "" && $data != " "){

// Get the columns we want (column 2, and 5) and echo them.

$column = explode(",",$data);

echo $column[2].",".$column[5]." \n";

}

}

?>

**Command Line Output:**

>> matlab\_practice

\* Solar Data Imported from ASU CM:

data =

0 0

0 0

0 0

0 0

0 0

0 0

4.4200 10.8300

96.0500 122.8700

298.7300 362.5600

421.6600 545.5100

574.6100 736.9500

698.6200 879.7700

500.7300 629.8000

446.7500 580.4800

340.9600 438.4800

429.8800 557.5300

353.3000 470.4000

95.5900 137.6800

5.8100 15.9300

0 0.0100

0 0

0 0

0 0

0 0

ComputationAnswer1 =

6

ComputationAnswer2 =

11

ComputationAnswer3 =

7.4366

ComputationAnswer4 =

-1.1102e-16

CircleArea =

78.5398

SecondElementinVectorA =

5

\* Answer for 3A-E:

E =

-4

\* Now we do some solar data analysis

avg\_power =

177.7963

avg\_irradiance =

228.7000

max\_power =

698.6200

max\_irradiance =

879.7700

insolation =

5.4888e+03

PeakSunHours =

5.4888

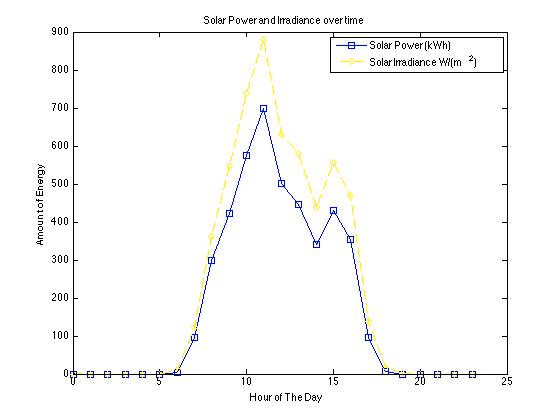
\* Linear Correlation between Electric Power and Solar Irradiance:

ans =

0.9996

\* Since our data is close to 1, there is a strong correlation!!

**Plot from Part 6:**

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1. **Post-lab Questions**
2. The maxium irradiance is during the day as the sun is mor eoverhead, thus more light can reach the solar panel. There is a strong positive relationship as it is very close to 1.
3. The nameplate power rating is not achieved because the energy outputed is only 78% of what is claimed.

**M-File:**

% Description: FSE 100 - Lab #2 - MATLAB Practice Script

% Author: Anthony Kosednar

% Date: 09/11/2012

% Define Variables

x = linspace(0,2\*pi,100);

g = x;

f = sin(2\*x);

g = 2\*cos(2\*x);

% Do Our Plotting

plot(x,f,'c:+',x,g,'g--\*')

% Create our labels

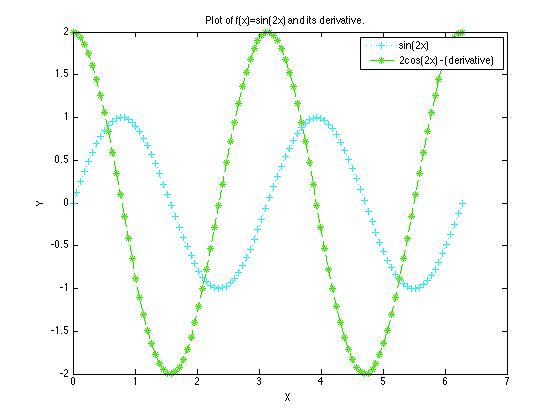
title('Plot of f(x)=sin(2x) and its derivative.')

xlabel('X')

ylabel('Y')

legend('sin(2x)','2cos(2x) - (derivative)')

**Plot:**

****