

CSE 200 Spring 2008, HW 3 – due date: Feb. 12, in class.

All problems are from the textbook, A. Gilat, *MATLAB: An introduction with applications*, 3<sup>rd</sup> edition

Problem 1: (4 points, give your code and results including plot)

Write a user-defined MATLAB function that gives a random integer number within a range between two numbers. For the function name and arguments use `n = randint(a, b)`, where the two input arguments `a` and `b` are the two numbers and the output argument `n` is the random number.

Use the function in the Command Window for the following:

- a) Generate a random number between 1 and 49.
- b) Generate a random number between -35 and -2.

```
function n=randint(a,b)
n=(b-a)*rand +a
%"ans" will be displayed in the command window unless n is
not assigned a
%value. However then when trying to set a variable to the
output of this
%function, there will not be an output variable at all.
```

Problem will be graded based on code.

Problem 2: (4 points, give your code and results including plot)

Write a user-defined MATLAB function for the following function:

$$r(\theta) = \sin(3\theta)\cos\theta$$

The input to the function is  $\theta$  (in radians) and the output is  $r$ . Write the function such that  $\theta$  can be a vector.

- a) Use the function to calculate  $r(\pi/4)$ , and  $r(5\pi/2)$ .
- b) Use the function to plot (polar plot)  $r(\theta)$  for  $0 \leq \theta \leq 2\pi$ .

```
function r=Problem2HW3(theta)
r=sin(3*theta).*cos(theta)
%The . before cos allows this function to work for matrix
inputs
```

a)

```
>> Problem2HW3(pi/4)
```

ans =

0.5000

```
>> Problem2HW3(5*pi/2)
```

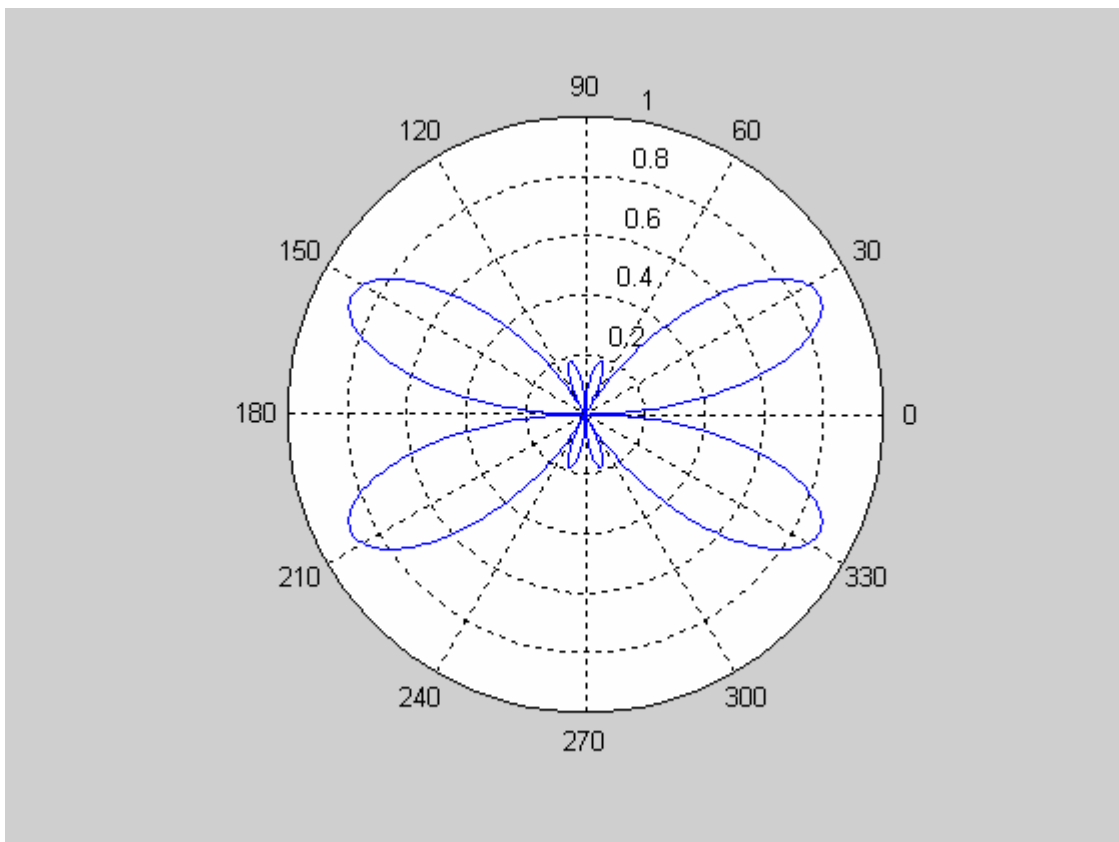
ans =

-3.0616e-016

b)

```
>> polar(theta,Problem2HW3(theta));
```

Plot:



Problem 3: (6 points, give your code and results) next page

Write a user-defined MATLAB function that calculates a student's final grade in a course using the scores from three midterm exams, a final exam, and six homework assignments. The midterms are graded on a scale from 0 to 100, and are each 15% of the final grade. The final exam is graded on a scale from 0 to 100, and is 45% of the final grade. The six homework assignments are graded each on a scale from 0 to 10. The homework assignments together are 10% of the final grade.

For the function name and arguments use  $g = fgrade(R)$ . The input argument  $R$  is a matrix in which the elements in each row are the grades of one student. The first six columns are the homework grades (numbers between 0 and 10), the next three columns are the midterm grades (numbers between 0 and 100), and the last column is the final exam grade (a number between 0 and 100). The output from the function,  $g$ , is a column vector with the final grades for the course. Each row has the final grade of the student with the grades in the corresponding row of the matrix  $R$ .

The function can be used to calculate the grades of any number of students. For one student the matrix  $R$  has one row. Use the function in the following cases:

- Use the Command Window to calculate the grade of one student with the following grades: (8, 9, 6, 10, 9, 8, 76, 86, 91, 80).
- Write a program in a script file. The program asks the user to enter the students' grades in an array (each student a row). The program then calculates the final grades by using the function `fgrade`. Run the script file in the Command Window to calculate the grades of the following four students:  
Student A: 8, 10, 6, 9, 10, 9, 91, 71, 81, 85.  
Student B: 5, 5, 6, 1, 8, 6, 59, 72, 66, 59.  
Student C: 6, 8, 10, 4, 5, 9, 55, 65, 75, 78.  
Student D: 7, 7, 8, 8, 9, 8, 83, 82, 81, 84.

```
function g=fgrade(R)
n=size(R,1);
for i=1:n;
    g(i,1)= mean(R(i,1:6))+sum(.15*R(i,7:9))+.45*R(i,10);
end
```

a)

```
>> fgrade([8,9,6,10,9,8,76,86,91,80])
```

ans =

82.2833

b)

```
r=input('please enter the students grades in an array. Each row\n corresponds to a student. The first 6 columns\n are HW grades on a scale of 1-10. The next 3 columns\n correspond to midterm grades on a scale from 1-100.\n The last column corresponds to the final exam on a scale of 1-100.')
```

```
fgrade(r)
```

please enter the students grades in an array. Each row corresponds to a student. The first 6 columns are HW grades on a scale of 1-10. The next 3 columns correspond to midterm grades on a scale from 1-100.

The last column corresponds to the final exam on a scale of 1-100.[8,10,6,9,10,9,91,71,81,85;5,5,6,1,8,6,59,72,66,59;6,8,10,4,5,9,55,65,75,78;7,7,8,8,9,8,83,82,81,84]

r =

```
8 10 6 9 10 9 91 71 81 85
5 5 6 1 8 6 59 72 66 59
6 8 10 4 5 9 55 65 75 78
7 7 8 8 9 8 83 82 81 84
```

ans =

```
83.3667
61.2667
71.3500
82.5333
```