M241-MATLAB (P. Staley) Lesson One

Command Window, Matrices, Examples of Matrix Functions, Subscripts, Expressions, and Survey of Built-in Functions

Do the following:
1. Open MATLAB, choose MATLAB Help to open the help window, choose "Matrices and Arrays" from the content tab of the Help Navigator Window.

2. Read and study the first two sections under Matrices and Arrays. They are titled "Matrices and Magic Squares" and"Expressions". As a guide for study and taking notes you should fill out the student notes portion below.

3. From the command window try
help elfun
and review the following:
sin , sinh, asin , asinh, cos, cosh, acos, acosh , tan, tanh, atan, atan2, atanh, sec,
sech, asec, asech, csc, csch, acsc, acsch, cot, coth, acot , acoth ,
exp, log, log10, log2, pow2, realpow, reallog, realsqrt, sqrt, nextpow2,
abs, complex, conj, imag, real,
fix, floor, ceil, round, mod, rem, and sign.

Most of these are the same or similar to the functions on your graphing calculator. The ones that are different and perhaps new to you are—
atan2, log, log10, log2, pow2, realpow, reallog, realsqrt, nextpow2,
complex, conj, imag, real,
fix, floor, ceil, round, mod, rem, and sign.

4. From the command window try
help elmat
and study the following:
zeros, ones, eye, rand, randn, size, length, isempty, isequal, cat,
diag, end, isscalar, isvector, ans, eps, realmax, realmin, pi , i or j,
inf, NaN, isnan, isinf, isfinite.

5. From the command window try
help specfun
and study the following:
cross, dot, factor, isprime, gcd, perms, nchoosek, factorial,
cart2sph, cart2pol, pol2cart, and sph2cart.

Exam One is based on the material on these pages. Let your instructor know when you are ready to take exam one.

Lesson One Student Notes

A matrix is a _____.

Special meaning is sometimes attached to 1-by-1 matrices, which are _____, and to matrices with only one row or column, which are called _____.

The basic conventions for entering matrices are—

Separate the elements of a row with _____ or _____.

Use a _____, to indicate the end of each row.

Surround the entire list of elements with _____.

[2,3,4] in MATLAB is a ____ by ____ matrix also referred to as a _____ _____.

[2;3;4] in MATLAB is a ____ by ____ matrix also referred to as a _____ _____.

When you do not specify an output variable, MATLAB uses the variable _____, short for _____, to store the results of a calculation.

The transpose operation is denoted by a(n) _____. The transpose operation _____ and turns a _____ vector into a _____ vector.

The MATLAB operation _____ produces a column vector containing the row sums.

Use the Help Navigator index to find the help information for diag [1] [2]. Read that information then answer the questions:

What would diag([1,2;3,4]) return?

What would diag([1,2;3,4],1) return?

What would diag([1,2,3]) return?

What would diag([1,2,3],-1) return?

Now continue from the help section: "sum, transpose, and diag"

Subscripts

In the computer language C+, row and column subscripts start with 0, in FORTRAN subscripts start with 1, in MATLAB subscripts start with ____.

The element in row i and column j of A is denoted by _____.

Suppose B is the MATLAB matrix [1, 2, 3; 6, 5, 4; 7, 8, 9]

What would be the value of the following:

MATLAB reference	value
B(1,1)	
B(3,3)	
B(4)	
B(9)	
B(0,0)	
B(3,4)	

Colon Operator

The row vector [m,m+1,m +2,…,n] can be generated in MATLAB with the colon operator as follows: _____.

The row vector [m,m+i,m +2i,…,n] can be generated in MATLAB with the colon operator as follows: _____

Fill in the table below:

MATLAB reference	value
1:5	
1:4:17	
	[-1, 2, 5, …26]
diag(1:3)	
sum(1:9)	
0: 0.5 :3	

Suppose B is the MATLAB matrix [1, 2, 3, 11; 6, 5, 4, 12; 7, 8, 9, 13],

fill in the table below:

MATLAB reference	value
B(1:2,3)	
B(:,2)	
B(end,2)	
B(2:3,end)	
B(2,1:2:4)	
B(1:5:10)	

To exchange the last two columns of B we could use

[B(:,1)'; B(:,3)';B(:,2)']' or B(_____, _____)

Expressions

In MATLAB expressions involve entire _____..

The building blocks of expressions are _____, _____,

_____, and _____.

Variable names consist of a _____, followed by any number of _____,

_____, or _____. MATLAB uses only the first

_____ characters of a variable name. MATLAB is case _____; that

means that it _____ between _____ and

_____ letters. To view the matrix assigned to any variable, simply

enter the _____.

Specify the following numbers in MATLAB acceptable notation:

MATLAB reference	value
	$6.02221367 \times 10^{23}$
	$6.6260755 \times 10^{-27}$
	$1.6726231 \times 10^{-24}$
	5780
	$\sqrt{-4}$
	$-2.1798741 \times 10^{-11}$

Floating-point numbers have a finite precision of _____ binary bits which is roughly

_____ significant decimal digits and a finite range of $2^{\pm}$———— or roughly 10^{-}——

to 10^{+}——.

MATLAB operators operate on _____. In addition to the common operators +, -, *, /, and ^; we also have \ for _____, .' for array transpose, and ' for _____ _____ _____.