16 November Matlab

We spend the rest of the semester looking at the programming language Matlab. This language has variables, if-statements, loops, methods (called functions and procedures), like Java. But it has no OO concepts. Instead, its operations on arrays and its ability to create graphs and tables make it well suited for a lot of engineering type problem solving.

We do not spend time looking at loops and if-statements --you can learn these things yourself. We concentrate instead on the new kinds of things that Matlab brings to the programming table.

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8th Grade Final Exam: Salina, KS, from 1895

This is an 8-hour test (continued on next page)

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8th grade test from 1895

Grammar (Time, one hour)

1. Give nine rules for the use of capital letters.
2. Name the parts of speech and define those that have no modifications.
3. Define verse, stanza, and paragraph.
4. What are the principal parts of a verb? Give principal parts of "lie", "play", and "run".
5. Define case; Illustrate each case.
6. What is punctuation? Give rules for principal marks of punctuation.
7 - 10. Write a composition of about 150 words and show therein that you understand the practical use of the rules of grammar.

Arithmetic (Time, 1.25 hours)

1. Name the Fundamental Rules of Arithmetic.
2. A wagon box is 2 ft. deep, 10 feet long, and 3 ft. wide How many bushels of wheat will it hold?
3. If a load of wheat weighs 3942 lbs., what is it worth at 50cts/bushel, deducting 1050 lbs. for tare?
4. District No. 33 has a valuation of $35,000. What is the necessary levy to carry on a school seven months at $50 per month, and have $104 for incidentals?
5. Find the cost of 6720 lbs. coal at $6.00 per ton.
6. Find the interest of $512.60 for 8 months and 18 days at 7 percent.
7. What is the cost of 40 boards 12 inches wide and 16 ft. long at $20 per metre?
8. Find bank discount on $300 for 90 days (no grace) at 10 percent.
9. What is the cost of a square farm at $15 per acre, the distance of which is 640 rods?
10. Write a Bank Check, a Promissory Note, and a Receipt.

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8th grade test from 1895

U.S. History (Time, 45 minutes)

1. Give the epochs into which U.S. History is divided.
2. Give an account of the discovery of America by Columbus.
3. Relate the causes and results of the Revolutionary War.
4. Show the territorial growth of the United States.
5. Tell what you can of the history of Kansas.
6. Describe three of the most prominent battles of the Rebellion.
7. Who were the following: Morse, Whitney, Fulton, Bell, Lincoln, Penn, and Howe?
8. Name events connected with the following dates: 1607, 1620, 1800, 1849, 1865 .

Orthography (Time, one hour)

1. What is meant by the following: Alphabet, phonetic, orthography, etymology, syllabication?
2. What are elementary sounds? How classified?
3. What are the following, and give examples of each: Trigraph, subvocals, diphthong, cognate letters, linguals 4.
Give four substitutes for caret 'u.'
(HUH?)
5. Give two rules for spelling words with final 'e.' Name two exceptions under each rule.
6. Give two uses of silent letters in spelling. Illustrate each.
7. Define the following prefixes and use in connection with a word:
bi, dis, mis, pre, semi, post, non, inter, mono, sup.

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8th grade test from 1895

Orthography (continued)

8. Mark diacritically and divide into syllables the following, and name the sign that indicates the sound: card, ball, mercy, sir, odd, cell, rise, blood, fare, last.
9. Use the following correctly in sentences: cite, site, sight, fane, fain, feign, vane, vain, vein, raze, raise, rays.
10. Write 10 words frequently mispronounced and indicate pronunciation by use of diacritical marks and by syllabication.

Geography (Time, one hour)

1. What is climate? Upon what does climate depend?
2. How do you account for the extremes of climate in Kansas?
3. Of what use are rivers? Of what use is the ocean?
4. Describe the mountains of North America.
5. Name and describe the following: Monrovia, Odessa, Denver, Manitoba, Hecla, Yukon, St. Helena, Juan Fernandez, Aspinwall and Orinoco.
6. Name and locate the principal trade centers of the U.S.
7. Name all the republics of Europe and give the capital of each.
8. Why is the Atlantic Coast colder than the Pacific in the same latitude?
9. Describe the process by which the water of the ocean returns to the sources of rivers.
10. Describe the movements of the earth. Give the inclination of the earth.

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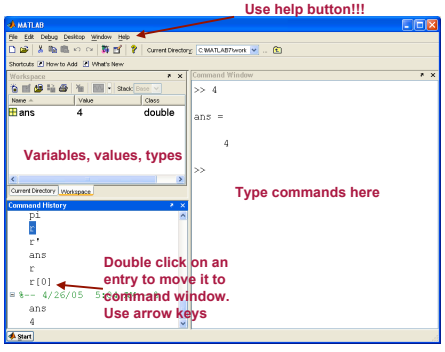
CS100J 16 November 2006. Matlab



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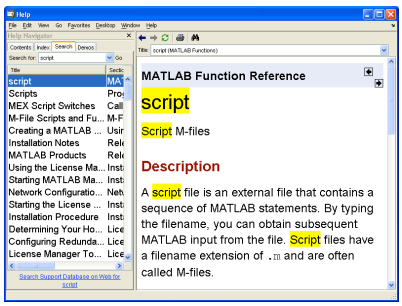
Scripts

Obtained by clicking help and searching for "script"



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Variables and types

In Java, every variable must be declared with a type, and the values that can be placed in a variable are restricted to variables of that type. Java is a *strongly typed* language.

In Matlab, no variable has to be declared, and you can put anything in a variable. One millisecond it may be an integer, the next, a two-dimensional array. Matlab is a *weakly typed* language.

Each kind of language has its advantages and disadvantages. Weakly typed languages, some say, provide more flexibility and ease of programming. Strongly typed languages offer protection against certain kinds of errors, like storing a boolean value by mistake in an integer variable. For large programs involving many programmers, strongly typed languages are invaluable.

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Scripts

Script file: an external file that contains a sequence of MATLAB statements. Has extension .m ; called M-file.

Type the filename to execute statements. Useful for automating blocks of MATLAB commands, such as computations you have to perform repeatedly from the command line.

Scripts can operate on data in the workspace or can create new data on which to operate. Any variables they create remain in the workspace

No declarations or begin/end delimiters required.

Comments: Any text following a percent sign (%) on a given line is comment text. Comments can appear on lines by themselves or can appear after a statement on an executable line.

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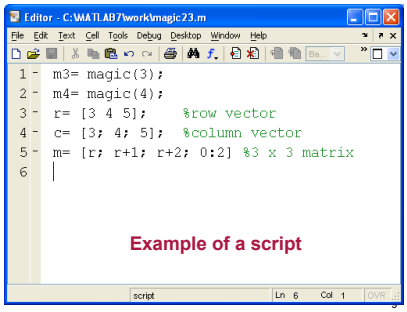
Created using File->New-> M-File. Stored automatically in folder work within MatLab. You can navigate to store it where you want. I

If you work in a Cornell lab, save your m-files on your own USB storage key or email them to yourself.



Example of a script

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Conditional statements

```
if expression
   statements
end

if expression1
   statements1
elseif expression2
   statements2
else
   statements3
end
```

Found these by typing "if" into search window of Help

Logical operators.

0 represents false
Not-0 represents true
A & B
A | B
~A
Short circuit evaluation:
A && B
A || B

Found these by typing "logical operators" into search window of Help

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Loops

```
for index= start: increment: end
   statements
end
```

If you leave out the increment, 1 is used.

```
while expression
   statements
end
```

Found this info by typing "loop" into search window of Help

```
%Example: binary search
t=  size(r);
nocols= t(2);
x= -5;
% Row Vector r is sorted.
% Store in h an integer that satisfies
%     r[1..h] <= x < f[h+1..nocols]
h= 0;
k= nocols+1;
%invariant: r[1..h] <= x < f[k..nocols]
while (h+1 < k)
   e= floor((h+k)/2);
   if (r(e) <= x )
      h= e;
   else k= e;
   end
end
```

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