

Computer Skills (AY 2015/16)

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Homework 1 (lessons from 3 to 5)

Exercise 1) Think about what the results would be for the following expressions and then type them into the command window of MATLAB or Octave to verify your answers.

```
5 - 3*4
3 + 2^2
(3 + 2)^2
10 + 6\2
10 + 6/2
(10+6)/2
4^3^2
4^(3^2)
2*-3
2^-3
```

Exercise 2) Write a MATLAB command to enter a fraction with $17.1 + 20.3$ in the numerator and $36.5 + 41.8$ in the denominator.

Exercise 3) How much storage does each variable use after the following MATLAB commands have been executed?

```
x = -3;
a = true;
var = 'a';
c = int32(67);
```

Exercise 4) Create two variables x and y and store numbers in them.

Write a MATLAB expression that is true if the value of x is outside the interval $[0, 10]$.

Write a MATLAB expression that is true if y is in the interval $[-2, 4]$ and false otherwise.

Write a MATLAB expression that is true if the value of x is greater than 2 or if the values of y is less than or equal to 6, but is false if both of those are true.

Exercise 5) Try to input the vector $v = [26, 23, 20, 17, 14, 11, 8, 5]$ in different ways. Use size and length to count the number of elements in v .

Try to input the matrix A using at least three different methods.

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{pmatrix}$$

a) Show the values of $A(2, 3)$.

b) Replace the value of $A(1, 1)$ with 0.

c) Input

```
A(8)
A(8)=10
A(8)
```

and describe what happens.

Exercise 6) Use the colon operator to create a row vector from 1 to 1000 and the `sum` built-in function to find the sum of the integers from 1 to 1000.

Use the colon operator to create a row vector of the odd integers from 1000 to 10000 and the `sum` built-in function to find the sum of the odd integers from 1000 to 10000.

Exercise 7) Given $x = [3 \ 1 \ 5 \ 7 \ 9 \ 2 \ 6]$, explain the meaning of the following commands by summarizing the net result of the command.

```
x(3)
x(1:7)
x(1:end)
x(1:end-1)
x(6:-2:1)
x([1 6 2 1 1])
max(x)
```

Exercise 8) Given a vector x which contains zeros (e.g., $x = [3, -1, 0, 2, 5, 0, 7]$), find a way to delete zeros from vector x .

Exercise 9) Enter the matrix `A=ones(5)`.

a) Explain how you can insert a row of all 5's between rows 2 and 3 of matrix A . Use MATLAB to verify your conjecture.

b) Explain how you can insert a column of all 5's between columns 3 and 4 of matrix A . Use MATLAB to verify your conjecture.

Exercise 10) Enter the matrix

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

a) Enter the MATLAB command `A(2,:) = A(2,:) - 4*A(1,:)`. Explain the result of this command.

b) Continue with the resulting matrix A from a). What is the output of the MATLAB command `A(3,:) = A(3,:) - 7*A(1,:)`? Explain the result of this command.

Exercise 11) Given the arrays $x = [1 \ 4 \ 8]$, $y = [2 \ 1 \ 5]$ and $A = [3 \ 1 \ 6; 5 \ 2 \ 7]$, determine which of the following statements will correctly execute and provide the result. If the command will not correctly execute, state why it will not.

```
x + y
x + A
[x y]
A - [x' y']
[x; y']
[x; y]
A - 3
```

Exercise 12) Consider a real data set that contains 2 vectors. `rt` is a vector of reaction times of one subject on a visual attention task. `cue` is a vector describing if the cue was valid (value 1), invalid (value 2) or absent (value 3).

- a) Create a logical vector called `valid` which defines all the trials with valid cues.
- b) Use the vector `valid` to find the mean of reaction time on valid cues.
- c) Error trials are ones where the reaction time is less than 100 msec or more than 1000 msec. Create a logical vector called `error` defining which trials are errors.
- d) Use both the vectors `error` and `valid` to find the mean of reaction times for correct valid trials.