$$A=\begin{bmatrix}1&2&1\\1&1&2\\2&2&1\end{bmatrix}, B=\begin{bmatrix}1&2&1&1\\1&1&2&1\\2&2&1&1\end{bmatrix}, C=\begin{bmatrix}2&1&1\\1&2&1\\2&1&1\end{bmatrix}, D=\begin{bmatrix}2\\1\\2\end{bmatrix}, F=[2\quad 1\quad 2\quad],$$

Problem 1.
What is the result of the evaluation of the following MATLAB expressions?

(a) 2/4
(b) 2\4
(c) 2 ^ 3
(d) 1 − 2 − 3
(e) 2 == 3
(f) 1 < 2
(g) 1 ∼= 0

Problem 2.

(a) What command do you use to clear MATLAB's workspace?
(b) What command do you use to clear the screen in the command window?
(c) What command do you use to see the variables defined by the user in the Workspace (just names)?
(d) What command do you use to see the variables defined by the user along with space in the Workspace ?
(e) A user has defined three variables in that appears in MATLAB's Workspace: `a,b,c`. How can it clear just variable b but leave as are variables a, c?

Problem 3.
Which of the following are legitimate variable names in MATLAB? Write `YES` if it is a legitimate name, or `NO` otherwise, next to the variable name. There are no spaces involved in the variable names if you wonder what the end of a variable name is.

(a) algorithmic
(b) alg___gorithmic
(c) Algorithmic
(d) A1gor1thm1c
(e) _Algorithmic
(f) Algor;thmic
(g) AZ12345678901234567890123456789012345678901234567890123456789012345678901234

Problem 4.
What is the 8-bit binary, octal and hexadecimal representation of base-10 `121` ?

Problem 5.
(a) How many bytes in a MATLAB `logical`?
(b) How many bytes for a MATLAB `double` ?

Turn page

Problem 6.
What is the result of the following MATLAB expressions ?

(a) $[1:3:13]$
(b) `zeros`$(2,3)$.
(c) `eye`(3).
(d) `ones`(2).
(e) `length`(F)
(f) `length`(B)
(g) `size`(B)
(h) `size`(A)

Problem 7.
What is the result of $C(1:2,[1 \quad 3]) = [10 \quad 20 \quad ; 30 \quad 40]$?

Problem 8.
What is the result of $C = C + 1$ if C is as it appears on the first page thus disregarding the changes implied by the previous problem?

Problem 9.
What are the results of the following operations (the matrices are as defined on the first page, before Problem 1). If an operation is not defined write next to it `UNDEFINED`.

(a) $A + C$.
(b) $A - C$.
(c) $A * C$.
(d) $A./C$.
(e) $A * B$.
(f) $D * F$.
(g) $F * D$.

Solutions

Problem 1.
(a) 0.5000 , (b) 2, (c) 8, (d) -4, (e) 0, (f) 1 , (g) 1,

Problem 2.
(a) **clear**
(b) **clc**
(c) **who**
(d) **whos**
(e) **clear b**

Problem 3.
(a), (b), (c), (d) are legitimate variables i.e. the answer is `YES`. (e), (f) are `NO` since neither a punctuation mark can be a character in a variable, nor a beginning underscore. (g) is longer than 63 characters; it is a legitimate variable i.e. we have `YES`. The problem is that MATLAB reads it as indistinguishable from say the variable `AZ123456789012345678901234567890123456789012345678901234567890123456789012345678901`, and thus one needs to be careful when he/she uses it. In fact MATLAB will truncate it to 63 (or `namelengthmax` characters) and use it onwards as if it has that many characters.

Problem 4.
Integer 121 in 8-bit binary is $\texttt{01111001}_2$.
In octal this is 171_8 or $0o171$ since $121 = \texttt{01 111 001}$.
Similarly in hexadecimal it is 79_{16} or $0x79$ since $121 = \texttt{0111 1001}$

Problem 5.
(a) 1 `logical` in MATLAB is 1 byte.
(b) 1 `double` in MATLAB is 8 bytes.

Problem 6.
(a) [1 4 7 10 13].
(b)

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}.$$

(c)

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

(d)

$$\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}.$$

(e) 3 since it's a vector of length 3.
(f) 4 since the max dimension is 4.
(g) [3 4].
(h) [3 3].

Problem 7.

$$C = \begin{bmatrix} 10 & 1 & 20 \\ 30 & 2 & 40 \\ 2 & 1 & 1 \end{bmatrix}$$

Problem 8.

$$C = \begin{bmatrix} 3 & 2 & 2 \\ 2 & 3 & 2 \\ 3 & 2 & 2 \end{bmatrix}$$

Problem 9.

(a)

$$A + C = \begin{bmatrix} 3 & 3 & 2 \\ 2 & 3 & 3 \\ 4 & 3 & 2 \end{bmatrix}$$

(b)

$$A - C = \begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

(c)

$$A * C = \begin{bmatrix} 6 & 6 & 4 \\ 7 & 5 & 4 \\ 8 & 7 & 5 \end{bmatrix}$$

(d)

$$A./C = \begin{bmatrix} 0.5000 & 2.0000 & 1.0000 \\ 1.0000 & 0.5000 & 2.0000 \\ 1.0000 & 2.0000 & 1.0000 \end{bmatrix}$$

(e)

$$A * B = \begin{bmatrix} 5 & 6 & 6 & 4 \\ 6 & 7 & 5 & 4 \\ 6 & 8 & 7 & 5 \end{bmatrix}$$

(f) Note that the product of a 3×1 vector D and a 1×3 row vector F is a 3×3 matrix.

$$D * F = \begin{bmatrix} 4 & 2 & 4 \\ 2 & 1 & 2 \\ 4 & 2 & 4 \end{bmatrix}$$

(g) This is what we call an inner vector product. $F * D = 4 + 1 + 4 = 9$.