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CS 101-008

Spring 2011

Exam 1(307 points)

75 minutes

NJIT

New Jersey's Science &
Technology University

Name: ....

ID Number: .... (7 points)   **Exam Number:** | .... |

Grade: 1: ... 2: ... 3: ... 4: ... 5: ... 6: ... 7: ... 8: ... Total: ....

Solve **ALL the problems** in the space provided

Read the Problems CAREFULLY!

There are 5 (FIVE) pages this page included

In the exam, the following matrices will be used. Do not get puzzled if a reference to matrix X, Y or Z or etc arises! If a problem modifies X and then another problem (not a question in a problem) uses X again, for the latter problem ignore the prior modifications; use/read X as it appears on this page not as modified before.

If you are asked to evaluate a MATLAB expression, and you think the result is undefined you could write `UNDEFINED` instead of giving an answer. For example `five == 5` is `UNDEFINED` since variable `five` has not been defined.

$$X = \begin{bmatrix} 1 & 2 & 3 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}, Y = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 2 \\ 2 & 2 & 1 \end{bmatrix}, Z = \begin{bmatrix} 1 & 2 & 1 & 2 \end{bmatrix}, R = \begin{bmatrix} 1 \\ 2 \\ 2 \end{bmatrix}, S = \begin{bmatrix} 1 & 1 & 1 \end{bmatrix},$$

Problem 1. (50 POINTS)
Give short answers to the following questions.

(a) How many bytes in 2KiB?

(b) What is a 1MB?

(c) What is a 1Mb?

(d) How many bytes is a MATLAB `double`?

(e) How many bytes is a MATLAB `logical`?

(f) What is the range of values for an 8-bit unsigned integer? (give number of values,lowest and highest value in the range.)

(g) What is matrix element $X(1, 3)$?

(h) What is array element $X(4)$?

(i) What is array element $Z(3)$?

(j) Represent decimal 128 in (8-bit unsigned) hexadecimal.

Problem 2. (30 POINTS)
(a) What is the number of bytes used to store `ans` after each one of the two lines below is executed? What is the data type of the array class used to store `ans` respectively?

```
>>  ans = 13;
>>  whos ans            %  Give  size of ans in bytes ......    data type   .........
>>  ans = true;
>>  whos ans            %  Give  size of ans in bytes ......    data type   .........
```

(b) How many bytes would MATLAB use to store R, S, X, Y, Z as defined on the cover page? Circle all that apply of the following answers:

- 31 bytes

- 62 bytes

- 124 bytes

- 248 bytes

- between 31 and 62 bytes (inclusive of the end points)

(c) If we want to clean up from the command windows the variables already defined which command do we use. Circle all that apply.

- clear

- clc

- either one

Problem 3. (30 POINTS)
What is the the result of the following MATLAB operations?
    (a) `t3 = R * S`
    (b) `u3 = Y * R`
    (c) `w3 = R' .* S`

Problem 4. (40 POINTS)
Evaluate the following MATLAB expressions. What are the values of a, b, c, d ?

    (i) $a = 2\hat{\ }3 + 2\hat{\ }1\hat{\ }2/2$

    (ii) $b = 1 + \sim 1 \& \sim 0$

    (iii) $c = 2 == 4 - 2 * \mathtt{true}$

    (iv) $d = 1 < 2 > 3$

Problem 5. (40 POINTS)
(i) List the elements of Z in column-major filin/form.

(ii) List the elements of Y in row-major filin/form.

(iii) Write MATLAB code that generates row vector S in two different ways. (A third way is the traditional
`>> S = [ 1 1 1]`. Give code for two other ways.

(iv) What is the effect of doing $K = 1 : 3 : 11$?

Problem 6. (30 POINTS)
(i) What is the effect of doing $P = ones(2) + eye(2) - 2$?

(ii) What is the value of `thisvar` after the second statement is executed below? What is it after the third statement is executed?

```
>>  thisvar = 5;
>>  thisvar = thisvar*10;
>>  thisvar = thisvar+thisvar;
```

(iii) What are the values of `a`,`b` at the end (last two lines)?

```
>>  a=4;
>>  b=8;
>>  t=2*a; a=b; b=t/2;
>>  a
>>  b
```

Problem 7. (40 POINTS)
For these calculations the matrices are those of the cover page. (If they have changed in previous problems, disregard those changes as explained in the instructions.)
(i) What is the result of $Z(3 : end) + 2$ in MATLAB?

(ii) What is the result of $Z = Z >= 2$?

Problem 8. (40 POINTS)
The 8-bit binary integer `10000101` what decimal integer does it represent if considered: (i) an unsigned integer, (ii) in signed mantissa representation, (iii) one's complement, and (iv) two's complement representations.

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Intentionally left blank. Copies of front-page matrices included
You can tear-off this last page and use it as scratch paper; do not turn IT in

End of Exam 1