

Name:

ID Number:

Exam Number:

Grade: 1: ... 2: ... 3: ... 4: ... 5: ... 6: ... 7: ... 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! No problem modifies X, Y, Z, R, S in a way that missing that problem would change the answer of any other problem of the exam.

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

$$X = \begin{bmatrix} 5 & 2 & 2 & 2 \\ 1 & 1 & 1 & 3 \\ 1 & 0 & 2 & 2 \end{bmatrix}, Y = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \end{bmatrix}, Z = [1 \ 2 \ 3 \ 2], R = \begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}, S = [1 \ 2 \ 2],$$

Problem 1. (50 POINTS)

Give short answers to the following questions.

- (1) How many bytes in 1KiB?
- (2) What is a 1kB?
- (3) How many bytes is a MATLAB `int8`?
- (4) How many bytes is a MATLAB `single`?
- (5) How many bytes is a MATLAB `logical`?
- (6) What is the range of values for an 8-bit unsigned integer such as `uint8` in MATLAB? (give number of values, lowest and highest value in the range.)
- (7) What is matrix element $Y(\text{end} - 1, \text{end})$?
- (8) What is array element $X(\text{end}, 2)$?
- (9) What is array element $X(\text{end} - 5)$?
- (10) Represent decimal (i.e. base-10) integer 16 in hexadecimal.

Problem 2. (60 POINTS)

(a) What is the value, the size in bytes, and the data-type of the array class of variable A in lines 3 and 6 below, when the following MATLAB program get executed?

```
>> A = (1 < 2) + 1;
>> A;
>> whos A           % A = ....      Size of A in bytes .....  data type of A .....
>> A = 1==false -true;
>> A
>> whos A           % A = ....      Size of A in bytes .....  data type of A .....
```

(b) What is the geometry of `pi`, what is its data type, and what is/are its values? What is the size of `pi` in bytes as reported by `whos pi`)?

```
pi(4)= 10;
whos pi; % geom of pi = ... x ... ,data type of pi = ..... , pi = .....
%
% Byte count of pi is .... bytes
```

(c) What is the effect of performing $q2 = 10 : -2 : 1$? What is the value of `q2`, what is its geometry, and its size in bytes?

```
>> q2 = 10:-2:1 ;
>> q2           % q2 = .....
%
>> whos q2;    % geom of q2 = ... x ...
%
% Byte count of q2 is .... bytes
```


Problem 6. (40 POINTS)

(a) What is the value of variable **q6a** defined as follows.

```
>> q6a = 1:5 == 2          % q6a = .....
```

(b) What is the value of **q6b** after the second statement is executed, the fifth, and the seventh? Write down the values in the corresponding space below.

```
>> q6b = 20;
>> q6b;                % q6b = .....
>> temp = 10;
>> q6b = q6b+10*temp /2;
>> q6b;                % q6b = .....
>> q6b = q6b/2;
>> q6b;                % q6b = .....
```

(c) What are the values of **my6A**, **my6B** at the end of the MATLAB program below (as indicated)?

```
>> my6A = 10;
>> my6B = 20;
>> t=my6A * my6B ; my6A = my6B ; my6B =t/10;
>> my6A                % my6A = .....
>>
>> my6B                % my6B = .....
```

Problem 7. (30 POINTS)

(a) What is the value of **F** defined as follows.

```
>> F= X( : , 1:2:4 );    % F = .....
```

(b) What is the value of **F** defined as follows.

```
>> G= X;
>> G( : , 3:end ) = [ ] ;    % G = .....
```

(c) What is the 8-bit binary representation of 28?

$$X = \begin{bmatrix} 5 & 2 & 2 & 2 \\ 1 & 1 & 1 & 3 \\ 1 & 0 & 2 & 2 \end{bmatrix}, Y = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \end{bmatrix}, Z = [1 \ 2 \ 3 \ 2], R = \begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}, S = [1 \ 2 \ 2],$$

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