Name	
Signature	

General instructions: You may not ask questions during the test. If you believe that there is something wrong with a question, write down what you think the question is trying to ask and answer that.

Question	Points	Score
1	4	
2	4	
3	4	
4	4	
5	4	
6	4	
7	4	
8	4	
9	4	
10	4	
11	4	
12	4	
13	4	
14	4	
15	4	
16	4	
17	4	
18	4	
19	4	
20	4	
21	4	
22	4	
23	4	
24	4	
25	4	
Total	100	

1. Which statement assigns the value 3200 to the variable `myNum` and suppresses the output from the command window?

   (a) `myNum == 3200`

   (b) `myNum = 3000 + 200`

   (c) `myNum == 3200;`

   (d) `myNum = 3.2e3;` ⇐

   (e) `myNum = 3.2e2;`

2. What are the values of `apples` and `oranges` after the following code executes?

```
apples = 5;
oranges = apples - 1;
oranges = oranges + apples;
apples = apples - 1;
```

   (a) `apples = 4, oranges = 9` ⇐

   (b) `apples = 5, oranges = 9`

   (c) `apples = 4, oranges = 8`

   (d) `apples = 5, oranges = 8`

   (e) `apples = 5, oranges = 4`

3. Indicate whether each statement is true or false.
(T/[✓ F]) A double precision number's range is about 1000 times greater than a single precision number's range.
(T/[✓ F]) Following the assignment `myNum = 5`, the variable `myNum` will be of type `int16`.
([✓ T]/F) Floating point numbers can represent larger numbers than unsigned integers.
([✓ T]/F) Due to rounding error, it is not necessarily true that `(a + b) + c = a + (b + c)` for some floating points values a, b, c.
([✓ T]/F) `eps(number)` will give the absolute error associated with representing that number in floating point.
([✓ T]/F) Computing `1/0` will yield the value `Inf`.
(T/[✓ F]) Computing `Inf - 0` with yeild the value `NaN`.

4. Using the precendence rules for arithmetic operators, determine which statement is true.

   (a) `1 / 3 * 3 == 1 / 9`

   (b) `2 ^ 2 * 2 == 16`

   (c) `2 + 2 * 3 == 12`

   (d) `10 / 5 + 2 == 4` ⇐

   (e) `2 - 3 * 2 == -2`

5. Consider the function definition,

```
function [ apples, oranges ] = MyFunction( pears )
  apples = pears * 2;
  oranges = apples - 1;
end
```

and the following code that calls this function:

```
apples = 1;
oranges = 3;
pears = 4;
[ oranges, pears ] = MyFunction( apples );
```

What will be the value of `apples`, `oranges`, and `pears` after the code executes?

(a) `apples = 1`, `oranges = 0`, and `pears = 1`

(b) `apples = 2`, `oranges = 2`, and `pears = 4`

(c) `apples = 2`, `oranges = 3`, and `pears = 1`

(d) `apples = 6`, `oranges = 2`, and `pears = 4`

(e) `apples = 1`, `oranges = 2`, and `pears = 1` ⇐

6. Which statement regarding functions and scripts is true?

(a) By default, variables defined in a script will not be visible in the main workspace.

(b) By default, variables defined in a function will not be visible in the main workspace. ⇐

(c) Functions can be called with multiple inputs but return only a single output.

(d) Like functions, scripts are terminated with the `end` keyword.

(e) Scripts can be called with input arguments.

7. Which statement regarding 1D arrays is true?

(a) `myArray = [ 1, 2, 3, 4 ];` creates a *row* array of size 4 × 1.

(b) `myArray = [ 1, 2, 3, 4 ]';` creates a *column* array of size 1 × 4.

(c) `myArray = [ 3:-1:0 ];` creates a *row* array of size 1 × 4. ⇐

(d) `myArray = [ 1:2:4 ];` creates a *row* array of size 1 × 3.

(e) `myArray = [ 1:7 ]'; myArray(6) = [];` results in an array of size 5 × 1.

8. For each `fprintf` statement in the left column, draw a line to the corresponding output in the right column.

```
fprintf('--%4.2f--', 2.718281828459046)
fprintf('--%5.2f--', 2.718281828459046)
fprintf('--%4.3e--', 2.718281828459046)
fprintf('--%4.0f--', 2.718281828459046)
```

```
--2.72--
-- 2.72--
--2.718e+00--
--   3--
```

9. Consider the following code:

```
myArray = [ 1:10 ];
isEvenNumber = mod(myArray,2) == 0;
evenNumbersArray = myArray(isEvenNumber);
```

Indicate whether each statement is true or false.
([✓ T]/F) evenNumbersArray has length 5.
(T/[✓ F]) isEvenNumber has length 5.
([✓ T]/F) isEvenNumber is of class logical.
(T/[✓ F]) myArray is of class int32.
([✓ T]/F) Matlab evaluates the command isEvenNumber = mod(myArray,2) == 0; the same as the command isEvenNumber = (mod(myArray,2) == 0);.

10. Consider the following code:

```
apples = 3;
oranges = 2;
pears = 1;
```

Indicate whether each statement is true or false.
(T/[✓ F]) apples <= oranges
([✓ T]/F) ~(apples ~= oranges+1)
([✓ T]/F) (apples > oranges) & (pears < 2)
(T/[✓ F]) (apples < oranges) | ~(pears < 2)
(T/[✓ F]) (pears & apples) < pears

11. Consider two floating point numbers, x and y, whose values lie between 1 and 10. Which of the following is the best way to test for equality of x and y?

(a) x == y

(b) abs(x-y) < 1

(c) abs(x-y) < .01 ⇐

(d) x-y < .001

(e) abs(x+y) < .0001

12. Fill in the following truth tables.

X	Y	and(X,xor(X,Y))
0	0	0
0	1	0
1	0	1
1	1	0

X	Y	not(X)
0	0	1
0	1	1
1	0	0
1	1	0

X	Y	or((X & Y),(∼X & ∼Y))
0	0	1
0	1	0
1	0	0
1	1	1

13. For each expression below, use the space provided to write the value of the expression or `error` if the expression is not valid Matlab code.

`not([ 0, 1, 1, 0 ])`	`[ 1, 0, 0, 1 ]`
`[ 0, 1, 0 ] & [ 1, 0 ]`	`error`
`[ 0, 1, 0 ] | 1`	`[ 1, 1, 1 ]`
`[ 0, 1, 0 ] & 0`	`[ 0, 0, 0 ]`

14. Given the array `myArray = [ -1, 2, 0, 4, -5 ]`, which statement sets all of the positive elements of `myArray` to 1?

(a) `myArray = (myArray > 0) .* myArray + (myArray < 0)`

(b) `myArray = (myArray ~= 0) .* myArray + (myArray > 0)`

(c) `myArray(myArray<0) = myArray & 0`

(d) `myArray = (myArray <= 0) .* myArray + (myArray > 0)` ⇐

(e) `myArray = (myArray >= 0) .* myArray + (myArray < 0)`

15. For each block of code in the left column, draw a line to the corresponding figure in the right column.

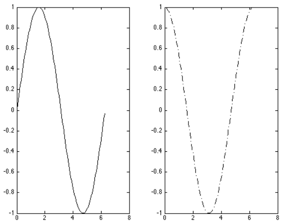
```
figure;
x = [0:.05:2*pi];
y = sin(x);
z = cos(x);
subplot(1,2,1)
plot(x,y,'-k');
subplot(1,2,2)
plot(x,z,'-.k');
```

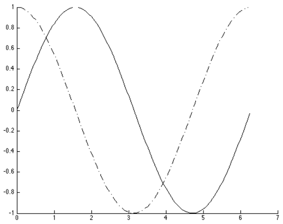
```
figure;
x = [0:.05:2*pi];
y = sin(x);
z = cos(x);
hold on
plot(x,y,'-k');
plot(x,z,'-.k');
```

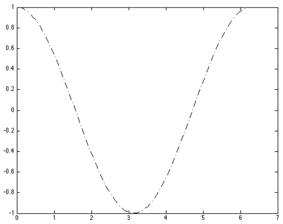
```
figure;
x = [0:.05:2*pi];
y = sin(x);
z = cos(x);
plot(x,y,'-k');
plot(x,z,'-.k');
```

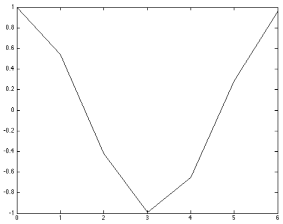
```
figure;
x = [0:1:2*pi];
y = sin(x);
z = cos(x);
plot(x,y,'-k');
plot(x,z,'-k');
```

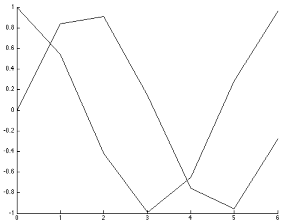
```
figure;
x = [0:1:2*pi];
y = sin(x);
z = cos(x);
hold on
plot(x,y,'-k');
plot(x,z,'-k');
```











16. Consider the following code.

```
x = [ 1, 2, 3, 4 ];
y = 7;
z = 1;
save('MyFile','y','z');
```

Which statment is true?

(a) All of the variables in the workspace are saved to a file `MyFile.mat`.

(b) `load('MyFile')` loads only the value of `x` into the workspace.

(c) `load('MyFile','x','y','z')` loads the values of `x`, `y`, `z` into the workspace.

(d) `load('MyFile','z')` loads the values of `y` and `z` into the workspace.

(e) `load('MyFile','y')` loads only the value of `y` into the workspace. ⇐

17. Indicate whether each statement is true or false.
(T/[✓ F]) `myName = 'Jane'; myName(4) = 'e'` results in `myName == 'Janee'`.
(T/[✓ F]) The command `uint8('abc')` will display the ASCII code for the letters `A`,`B`, and `C`.
(T/[✓ F]) `char('Hello','my','name','is','Jane')` will concatenate the input strings into one string.
([✓ T]/F) The code `any('Jane' == 'jane')` generates `true`.
([✓ T]/F) The code `all(upper('Jane') == 'JANE')` generates `true`.

18. Match the statement in the left column with the resulting value in the right column.

```
myArray = [ 1, 4, 3, 4; 5, 6, 7, 8 ]
```

```
myArray = [ 1, 4, 3, 4; 5, 6, 7, 8]'
```

```
myArray = [ [1, 2]; [4, 5, 6] ]
```

```
myArray = [ 1, 2, 3, 4; 5, 6, 7, 8 ]
myArray(2,1) = 4
```

$$\begin{bmatrix} 1 & 4 & 3 & 4 \\ 5 & 6 & 7 & 8 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 5 \\ 4 & 6 \\ 3 & 7 \\ 4 & 8 \end{bmatrix}$$

`error`

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ 4 & 6 & 7 & 8 \end{bmatrix}$$

19. Regarding 2D arrays, indicate whether each statement is true or false.
([✓ T]/F) Row-column indexing uses two numbers to index the array while linear indexing uses one number.
([✓ T]/F) If the linear index of element (m,n) is k, then the linear index of element (m+1,n) is k+1.
(T/[✓ F]) If the linear index of element (m,n) is k, then the linear index of element (m+1,n+1) is k+2.
(T/[✓ F]) If the linear index of element (m,n) is k, then the linear index of element (m,n+1) is k+1.

20. Let

```
myArray  = [ 1, 2, 3; 4, 5, 6 ]
```

Which statement is <u>false</u>?

(a) `myArray(:,3)=[]` deletes the third column of `myArray`.

(b) `myArray(1:2,3:4)` gives an error.

(c) `myArray([1, 2, 1],3)` gives an error. ⇐

(d) `myArray([2:-1:1],1)` is the subarray `[ 4, 1 ]'`.

(e) `myArray(:)` gives a 6×1 array.

21. Let

```
myArray  = [ 10, 20, 30, 40; 50, 60, 70, 80; 90, 100, 110, 120 ]
```

Which statement is true?

(a) `myArray = myArray(:)` does <u>not</u> change the shape of `myArray`.

(b) `myArray = reshape(myArray,4,3)` does <u>not</u> change the shape of `myArray`.

(c) `myArray = reshape(myArray,2,2)` changes the shape of `myArray2` to 2×2.

(d) The statement `myArray(:) = myArray(:) + [1:12]'` changes the *shape* of `myArray`.

(e) The statement `myArray(:) = myArray(:) + [1:12]'` changes the *values* in `myArray` but leaves the shape the same. ⇐

22. Given `myArray = [ 10, 20, 30, 40, 50; 60 70 80 90 100 ]`, match the statement in the left column with the result in the right column.

`size(myArray)`	[2, 5]
`length(myArray)`	5
`numel(myArray)`	10
`ndims(myArray)`	2

23. Which statement about `sort` and `sortrows` is false

    (a) `sort` will sort the columns of a 2D array independently of each other.

    (b) `sortrows` will sort the columns of a 2D array independently of each other. ⇐

    (c) Given the array `names = char('Frank','Kate','Jane');`, the command `sortrows(names)` will alphabetize the names.

    (d) Given the code `[sortedArray, sortedIndices] = sort(array);` for some numeric array `array`, the statement `all(sortedArray == array(sortedIndices))` will evaluate to true.

    (e) Given `array = [ 8 10 7 1 9 ]; [sortedArray, sortedIndices] = sort(array);`, the value of `sortedIndices` is `[ 4 3 1 5 2 ]`.

24. Let

```
A = [ 1 2; 3 4 ];
B = [ 5 6; 1 3 ];
```

Fill in the results of the following operations.

`A * B`	=	`[ 7 12; 19 30 ]`
`A .* B`	=	`[ 5 12;  3 12 ]`
`A.^2`	=	`[ 1  4;  9 16 ]`
`B'`	=	`[ 5  1;  6  3 ]`

25. Given the system of equations,

$$\begin{aligned} 5x + 4y + 3z &= 7 \\ x - 3y + z &= -1 \\ 2x - z &= 0, \end{aligned}$$

write a few lines of Matlab code in the space below to solve the system for x, y, and z.

```
A = [ 5 4 3 ; 1 -3 1 ; 2 0 -1 ];
b = [ 7 -1 0 ]';
solution = A \ b;
```