

ENSC 180 - Introduction to Engineering Analysis Tools, Spring 2015

Midterm Exam 1

Friday, February 6, 2015

1. (10 points) Let $A = [1 \ 2 \ 5 \ 6; \ 3 \ 4 \ 7 \ 8]$, $B = [2 \ 4]$, and $C = [1 \ 2 \ 3 \ 4]$. What is the result of the following commands? If there is an error, indicate it.

a) $A*B$

Error - matrix dimensions do not agree

b) $A*B'$

Error - matrix dimensions do not agree

c) $A'*B$

Error - matrix dimensions do not agree

d) $B*A$

$[14 \ 20 \ 38 \ 44]$ worth 2 points

e) $A*C$

Error - matrix dimensions do not agree

f) $A*C'$

44
 64 worth 2 points

g) $C*A$

Error - matrix dimensions do not agree

h) $C'*A$

Error - matrix dimensions do not agree

2. (10 points) Let $A = [1 \ 3 \ 2 \ 4; \ 5 \ 9 \ 6 \ 10; \ 1 \ 1 \ 3 \ 5]$. What is the output of the following? If there is an error, indicate it.

a) $A(2:3, 1:3)$

```
5 9 6
1 1 3
```

b) $A(2:6)$

```
5 1 3 9 1
```

c) $A(2:2:6)$

```
5 3 1
```

d) $A(:, 3)$

```
2
6
3
```

e) $A(7:-2:3)$

```
2 9 1
```

3. (10 points) Let $A = [1 \ 2; \ 3 \ 4]$ and $B = [5 \ 6]$. What is the output of the following? If there is an error, indicate it.

a) $[A; \ B]$

```
1 2
3 4
5 6
```

b) $[A; \ B']$

Error - dimensions must be consistent

c) $[A \ B']$

```
1 2 5
3 4 6
```

d) $[0:3; \ A \ [B;B]]$

```
0 1 2 3
1 2 5 6
3 4 5 6
```

(Part d worth 4 points, others 2 points each)

4. (10 points) Let $A = [5 \ 7 \ 3 \ 4 \ 1]$ and $B = [1 \ 2 \ 3 \ 4 \ 5]$. What is the output of the following? If there is an error, indicate it.

a) $A > B$

1 1 0 0 0

b) $A < B$

0 0 0 0 1

c) $A \leq B$

0 0 1 1 1

d) $\sim(A==B)$

1 1 0 0 1

e) `find(A==B)`

3 4

Note: $I = \text{find}(X)$ returns the linear indices corresponding to the nonzero entries of the array X . If there are no nonzero elements of X , an empty array will be returned.

5. (10 points) Let $A = \{1, 'two'; '3', 4\}$. What is the output of the following? If there is an error, indicate it.

a) $A(1, 2)$

`'two'` (cell)

b) $A\{1, 2\}$

`two` (string - content of the cell)

c) Explain the difference between the outputs of a) and b)

$A(1, 2)$ returns the cell in row 1, column 2.

$A\{1, 2\}$ returns the content of the cell (in this case, a string) in row 1, column 2.

(part c worth 4 points, others 3 points each)

6. (10 points) Let `str = 'This question is easy'`. What is the output of the following? If there is an error, indicate it.

a) `str == 't'`

```
0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0
```

b) `find(str == 't')`

```
10
```

c) `str(str > 'x') = 's'`

```
This question is eass
```

d) `sum(str <= 'b' & str >= 'd')`

```
0
```

Note: `I = find(X)` returns the linear indices corresponding to the nonzero entries of the array `X`. If there are no nonzero elements of `X`, an empty array will be returned.

(parts c and d worth 3 points each, parts a and b 2 points each)

7. (10 points) What are the contents of x after executing the following code? If there is an error, indicate it.

```
x = zeros(1,7);  
for n = 2:5  
    if n < 4  
        x(n) = x(n-1) + 2;  
    else  
        x(n) = [2 -1]*[x(n-1) x(n-2)]' - 1;  
    end  
end
```

Answer:

```
x = [0 2 4 5 5 0 0]
```

8. (20 points) Write a function `my_div`, with the following input-output arguments:

```
function d = my_div(x)
```

The function should accept vector `x` and do the following:

1. If `x` has less than two elements, return `NaN` and output a warning

```
x has less than 2 elements
```

2. If `x` has exactly two elements, return the ratio of the first element of `x` divided by the second element of `x`

3. If `x` has more than two elements, return the ratio of the first element of `x` divided by the second element of `x`, and output the warning

```
x has more than 2 elements
```

Answer:

```
function d = my_div(x)

if length(x) < 2
    disp('x has less than 2 elements')
    d = NaN;
elseif length(x) == 2
    d = x(1)/x(2);
else
    d = x(1)/x(2);
    disp('x has more than 2 elements')
end
```

9. (10 points) You are given a text file named 'alice_in_wonderland.txt' with the following contents:

```
Once upon a time
in a land far, far away
there was a girl with a dragon tatoo.
```

After executing the following code, what are the contents of `str1` and `str2`? If there is an error, indicate it.

```
fid = fopen('alice_in_wonderland.txt', 'rt');
str1 = fscanf(fid, '%s', 3);
str2 = fscanf(fid, '%c', 3);
fclose(fid);
```

Note: `fscanf(FID, FORMAT, N)` reads at most `N` elements specified in `FORMAT`.

Answer:

```
str1 = Onceupona
str2 =  ti          (first character is a space)
```