

Midterm Examination

February 23, 2011

30 Questions, 45 Minutes

Notes:

1. Before you begin, please check that your exam has 10 pages (including this one).
2. Write your **name**, **student ID number**, **lab section**, and **FORM LETTER** clearly on your scantron.
3. You may use a pencil, eraser, and a two-sided 8.5" by 11" sheet of notes for this exam provided you do not disturb those sitting nearby. No electronic devices are permitted in your work area. This includes, but is not limited to: calculators, cell phones, mp3 players, and laptops.
4. Record your answers on a green scantron sheet using a #2 pencil. There is one correct answer for each question. Multiple bubbles, incomplete bubbles, or stray marks will be marked incorrect.
5. There will be no questions regarding the exam during the examination time.

Form A

Question 1: What is the purpose of parenthesis, (), in Matlab?

- a) Array indexing
- b) Specifying function inputs
- c) Superceding standard order of operations
- d) All of the above
- e) Parentheses are not used in Matlab.

Question 2: What is the most exact description of the Matlab operation denoted by the .* symbol?

- a) Multiplication
- b) Element-by-element multiplication
- c) Matrix multiplication
- d) The description of .* depends on the surrounding context.
- e) This symbol does not denote a Matlab operation

For Questions 3 to 6 assume the following lines of code have been executed at the command prompt.

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

Question 3: Which of the following lines of code will **not** produce an error when executed at the command prompt?

- a) >> X = [A, B]
- b) >> X = [A; B]
- c) >> X = [B; A]
- d) >> X = A + B
- e) All of the code segments will produce an error.

Question 4: Which line of code will produce the same x as the following command?

```
>> X = (A(1:2, :) * B(1,3)) + B(1:2, 2:3);
```

- a) X = [4 8; 13 17];
- b) X = [[5; 14], [9; 18]];
- c) X = [[5, 14]; [9, 18]];
- d) This code will produce an error.
- e) None of the above.

(code repeated)

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

Question 5: Which error will the following line of code produce?

```
>> X = A([1 3], :) .* B(:, [1 3]);
```

- a) Unbalanced or unexpected parenthesis or bracket.
- b) Index out of bounds
- c) Matrix dimensions must agree.
- d) Undefined function or variable 'A'.
- e) This line of code will not produce an error.

Question 6: What will be the value of x after the following line of code is executed?

```
>> X = [A(1, :), B(2, 1:2)];
```

- a) [1 2 1 2 3]
- b) [1; 3; 4; 1; 4]
- c) [1 2 4 5]
- d) [1 2 4 5 6]
- e) The code segment will produce an error.

For Questions 7 to 12, assume the following code has been executed at the command prompt:

```
>> job(1).title = 'teacher'  
>> job(1).salary = 50000;  
>> job(1).location = 'Los Angeles'  
>> job(1).hasBenefits = 1;  
>> job(2).title = 'independent contractor'  
>> job(2).salary = NaN;  
>> job(2).location = 'San Francisco';  
>> job(2).hasBenefits = 0;  
>> job(3).title = 'lawyer';  
>> job(3).salary = Inf;  
>> job(3).location = 'New York';  
>> job(3).hasBenefits = 1;
```

Question 7: What will be the value of x after the following line of code is executed:

```
>> job(1).salary = x
```

- a) 1
- b) 50000
- c) 'struct'
- d) 'salary'
- e) The code will produce an error.

Question 8: What will be the value of x after the following line of code is executed:

```
>> x = length(job)
```

- a) 3
- b) 4
- c) [1 3]
- d) [1 4]
- e) The code will produce an error.

Question 9: What will be the value of x after the following line of code is executed:

```
>> x = class(job(3).title)
```

- a) 3
- b) Inf
- c) 'double'
- d) 'char'
- e) The code will produce an error.

Question 10: What will be the value of x after the following line of code is executed:

```
>> x = size([job(1).location(1:3), job(2).location(1:3), job(3).location(1:3)])
```

- a) 3
- b) [1 3]
- c) 9
- d) The code will produce an error.
- e) None of the above.

Question 11: What will be the value of x after the following line of code is executed:

```
>> x = class(job(4))
```

- a) 'double'
- b) 'char'
- c) 'struct'
- d) 'cell'
- e) The code will produce an error.

Question 12: What will be the value of x after the following line of code is executed:

```
>> x = job(1).hasBenefits && job(2).hasBenefits || job(3).hasBenefits
```

- a) 0
- b) 1
- c) 3
- d) 'logical'
- e) The code will produce an error.

Question 13: Let A be a one dimensional matrix, a be a scalar value, and tol be a scalar value defined in the current workspace. Which of the following lines of code will assign 0 to the elements of A wherever $(A - a)^2 < tol$.

- a) `find((A-a).^2 > tol) = 0`
- b) `find((A-a).^2 < tol)`
- c) `A(find((A-a).^2 > tol)) = 0`
- d) `A(find((A-a).^2 < tol))`
- e) None of these lines of code produce the correct A .

For Questions 14 to 17, consider the following blank function header.

Blank function header: $\frac{\text{_____}}{\text{(a)}} \left[\frac{\text{_____}}{\text{(b)}} \right] = \frac{\text{_____}}{\text{(c)}} \left(\frac{\text{_____}}{\text{(d)}} \right)$

e) None of the above.

Question 14: Which location in the function header is where input arguments are specified? (d)

Question 15: Which location in the function header is where output arguments are specified? (b)

Question 16: Which location in the function header is where the keyword “function” is placed to specify that this m-file is a function? (a)

Question 17: Which location in the function header is where the name of the function is specified? (c)

Question 18: Let f be a mathematical function defined by $f(x,y) = (x - y)(x^2 + y^2)$.

Which of the following lines will produce a handle to a Matlab function representing f ?

- a) `f(x,y) = (x - y)*(x^2 + y^2);`
- b) `@f(x,y) = (x - y)*(x^2 + y^2);`
- c) `f @(x,y) = (x - y)*(x^2 + y^2);`
- d) `f = @(x,y) (x - y)*(x^2 + y^2);`
- e) None of these lines will produce the proper function handle.

For Questions 19 to 21, consider the following m-file, exam_1.m.

exam_1.m

```
function [a] = exam_1(b, c, d)
b = b/2;
a = exam_2(b, c + d);
a = a/2;
end % end exam_1

function [a] = exam_2(b, c)
c = c/2;
a = b * c;
end % end exam_2
```

Assume that the following code is executed at the command prompt.

```
>> a = 2;
>> b = a + 2;
>> a = exam_1(4, b, a);
```

Question 19: What will be the value of `a` after the previous code is executed?

- a) 2
- b) 3**
- c) 4
- d) `a` will not be assigned after the code is executed.
- e) None of the above.

Question 20: What will be the value of `b` after the previous code is executed?

- a) 2
- b) 3
- c) 4**
- d) `b` will not be assigned after the code is executed.
- e) None of the above.

Question 21: What will be the value of `c` after the previous code is executed?

- a) 2
- b) 3
- c) 4
- d) `c` will not be assigned after the code is executed.**
- e) None of the above.

Question 22: What will be the value of `a` after the following line of code is executed?

```
>> a = exam_2(5,6);
```

- a) 5
- b) 6
- c) 15
- d) 30
- e) This code will produce an error.

Question 23: What will be the value of `z` after the following code is executed?

```
x = 3;  
y = 1;  
if x>2 && y<2  
    z = 1;  
elseif x==3 && y == 1  
    z = 2;  
else  
    z = 3;  
end
```

- a) 1
- b) 2
- c) 3
- d) There is not enough information to make this determination.
- e) This code will produce an error.

Question 24: Max wants to go on a date with Jane. If he has greater than or equal to \$20 and Jane says yes, they will go to a movie. If he has greater than or equal to \$20 and Jane says no, then Max will find someone else. If Max has greater than or equal to \$10 but less than \$20 and Jane says yes, they will get coffee. If Max has greater than or equal to \$10 but less than \$20 and Jane says no, then Max will go see a movie by himself. If Max has less than \$10, he will write Jane a poem.

Assume that `cash` is an integer representing how much money Max has. Also assume that `Jane` is a logical variable, where `Jane` is 1 if she says “yes” to Max’s request, and 0 if she says “no”. Which of the following statements do not belong in a branching statement describing this scenario?

- a) `if money >= 20 && Jane`
 `out = 'See a movie with Jane';`
- b) `elseif money >= 20 && ~Jane`
 `out = 'Ask someone else';`
- c) `elseif money >= 10 && ~Jane`
 `out = 'See movie alone';`
- d) All of the above belong in the program.
- e) None of the above belong in the program.

Question 25: What will be the value of `n` after the following code is executed?

```
n = 0;
for i = 1:1000
    for j = 1:1000
        if i == j && rem(j,2) == 0
            n = n + 1;
        end
    end
end
end
```

- a) 0
- b) 500**
- c) 500000
- d) 1000000
- e) None of the above.

Question 26: What will be the value of `count` after the following code is executed?

```
n = 10000000;
count = 1;
while n > 1
    n = n/10;
    count = count + 1;
end
```

- a) 10000000
- b) 10
- c) 1
- d) This code will loop infinitely.
- e) None of the above.**

Question 27: Consider the following code segment:

```
A = [1 2 5 3 6 4 2 5 6 9 2 5 7 6 2];
b = 0;
for j = 1:length(A)
    if A(j) == 2
        b = b + 1;
    end
end
end
```

Which of the following lines of code will produce an equivalent value for `b`?

- a) `b = find(A==2)`
- b) `b = sum(find(A==2))`
- c) `b = sum(A==2)`**
- d) `b = find(sum(A==2))`
- e) None of the above

For Questions 28 and 29, consider the following m-file, exam_3.m.

exam_3.m

```
function [out] = exam_3(M)
% M is a square matrix of doubles

[m,n] = size(M);

out = 0;

for i = 1:n
    for j = (i+1):n
        if M(i,i) == M(j,j)
            out = 1;
            return
        end
    end
end

end % end exam_3
```

Question 28: What will be the value of `out` after the following code is executed?

```
>> M = [9 1 3 2; 8 4 9 0; 8 1 3 2; 0 1 3 9];
>> out = exam_3(M);
```

- a) 0
- b) 1**
- c) 9
- d) The line “>> out = exam_3(M)” will produce an error.
- e) None of the above.

Question 29: What will be the value of `out` after the following code is executed?

```
>> M = [1 9 3 2; 7 8 5 1; 2 3 0 9; 5 7 1 9];
>> out = exam_3(M);
```

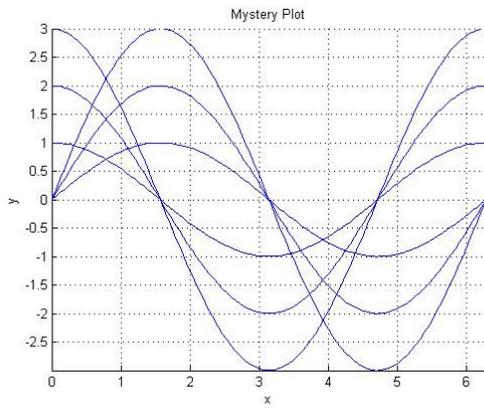
- a) 0**
- b) 1
- c) 9
- d) None of the above.
- e) This value of M will produce an error.

Question 30: Consider the following m-file, exam_4.m.

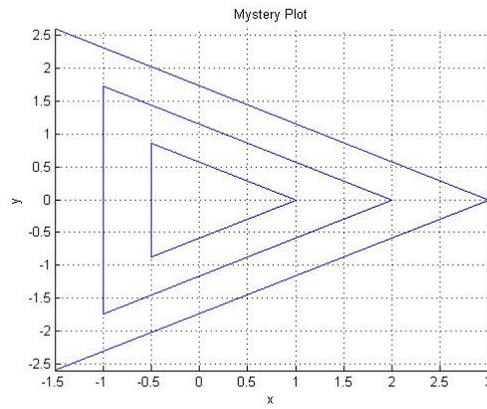
exam_4.m

```
function [] = exam_4(n)
x = linspace(0,2*pi,100);
hold on
for k = 1:n
    plot(k*cos(x), k*sin(x))
end
title('Mystery Plot')
xlabel('x')
ylabel('y')
grid on
axis tight
end % end exam_4
```

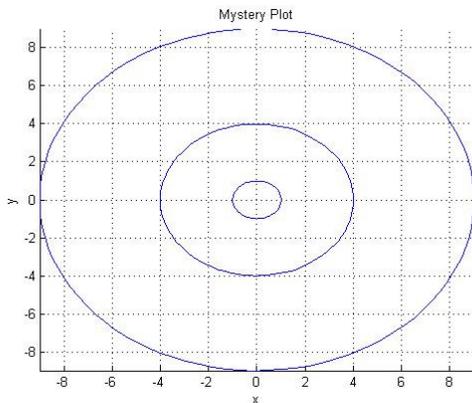
Which plot will be produced from the following line of code: `>> exam_4(3)`



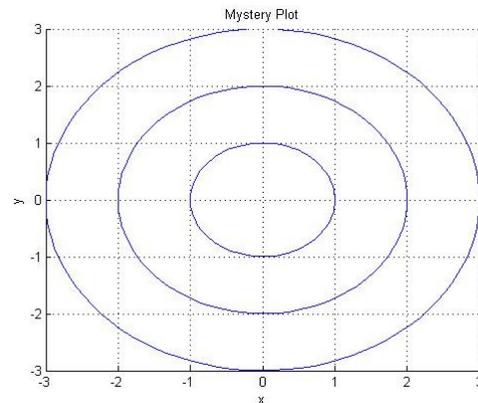
a)



b)



c)



d)

e) None of the above.