CS101: Program Language & Problem Solving
Sample Exam for Second Exam

Note that ‘a’=97, ‘A’=65, and ‘0’=48.

Part I. True or False. Circle one.

1. T or F: If A and B are two matrices with different dimensions then size(length(A)) is equal to size(length(B)).

2. T or F: If a=[1, 2, 3] and b=[3; 2; 1] then b*a returns a scalar.

3. T or F: If two logical matrices a and b have the same size, then xor(xor(a, b), a) returns a.

4. T or F: If A is a squared matrix, then A^ -1 is always existed.

5. T or F: ‘abc’.*’xyz’ returns an array of numbers.

6. T or F: If A is a matrix then the expressions A.*A and A.^2 are the same.

7. T or F: To draw multiple figures, statement subplot(1,2,3) can be used.

8. T or F: The expression 1\5 returns 5.

9. T or F: If a=[1, 2, 3]' then a'*a returns a scalar.

10. T or F: (2^3^4) returns the same value as (2^(3^4)).

11. T or F: If A is a squared matrix, then A*A' = A'*A is always true.

12. T or F: If A and B are two matrices with different dimensions then size(length(A)) is equal to size(length(B)).

Part II. Short answers. Let a = [2, 4, 3; 4, 3, 0; 3, 1, 2 ].

13. a(end−1,  2:end) returns: _________________________.

14. (mod(a,3) == 0) returns: _________________________.

15. If A is a 4x4 matrix, then A*A^ (-1) returns: _________________________.

16. If a=[3, -1, 0, 12, 8, 4, 9] and [m,n]=min(a), then [m,n]= _________________________.

17. If a='A' and b=1, then a+b returns: _________________________.

18. If a=[3.2, 5.6, 8.2, 7.85, 11.4], then round(a) returns _________________________.

19. a(:, 2:3)=[ ] returns: _________________________.

Part III. Short answers.

20. A is an m-by-n matrix with m>n>1. Circle all the legible expressions in the following list:
   A * A'      A / A'     A .* A
   A ./ A      A .+ A     A .^ 2
21. If \( x \) is a \( m \)-by-\( n \) matrix, then transfer the following expressions into MATLAB statements.

   a) \( 5x^2 + 3x - 2x^* \sin(x) \): ___________________________________.

   b) \( (x^2 - 3x)/(3x^2 + 7x - 4) \): ___________________________________.

22. According to the precedence of the operators, use parentheses to isolate them in their operating orders. For example: \( 2 - 5^3 \times 4 \) will be presented as \( (2 - ((5^3) \times 4)) \).

   a) \( 2 \times 4^3 + 4 \times 7^2 \times 4 - 3 \times 2 \): ________________________________.

   b) \( 4 \times 3^7 + 5^4 \times 2^6^2 \): ________________________________.

Part IV. Short answers. (12 Points – 3 Each)

23. If \( x = 6.345 \) then \( \text{ceil}(x) = \) _____________ and \( \text{round}(x) = \) _____________.

24. If \( x = 3.1415927 \) then the MATLAB statement of

\[
\text{fprintf(''var x = %010.4f\n'', x)}
\]

returns: _____________________________________.

Part V. Short answers.

25. (5 Points) Use matrix operations to create an array of \( N \) elements with \( n \)-th element valued as \( (n^2 - 7)/(n^2 + 10n - 5) \). The integer \( N \) should be got from a keyboard.

26. (6 Points) Given the following script, state the output.

   Output 1: (3 points)
   
   \[
   \begin{align*}
   &\text{a} = [1:3; 7:-3:1]; \\
   &\text{mod(a, 2)} \\
   &\text{a(:)} = 1:6
   \end{align*}
   \]

   Output 2: (3 points)

27. (7 Points) Assume that \( x \) is degree in the range of \( [0, 2\pi] \), \( y = \sin(x) - \cos(3x) \), and \( z = \cos(x) - \sin(3x) \). How to create a figure like the given picture? Specify the statements that create such a graph.