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. (20 Points – 2 Each)
1. T or F: isnumeric (‘abc’–‘a’) returns false.
2. T or F: If a=[ ], then isnumeric(a) returns true.
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: A logical value in MATLAB is the same as a double.
5. T or F: Relational operators have a higher precedence than logical operators.
6. T or F: If A is a squared matric, then A^−1 is always existed.
7. T or F: T or F: ‘abc’.*’xyz’ returns an array of numbers.
8. T or F: If A is a matrix then the expressions A.*A and A.^2 are the same.
9. T or F: To draw multiple figures, statement subplot(1,2,3) can be used.
10. T or F: 1 \ 5 is the same as 5/1.

Part II. Short answers. (8 Point – 2 Each) Let a = [ 2, 4, 3; 4, 3, 0; 3, 1, 2 ].
11. a( end−1, 2:end ) returns: ________________________________.
12. (mod(a,3) == 0) returns: ________________________________.
13. If a=[3, −1, 0, 12, 8, 4, 9] and [m,n]=min(a), then [m,n]= ________________________.
14. If a=[3.2, 5.6, 8.2, 7.85, 11.4], then round(a) returns ________________________.
15. a( :, 2:3 )=[ ] returns: ________________________________.

Part III. Short answers. (16 Points – 2 Each) Given the following conditions, answer the following questions: A=[1, 0, 2, −3], B=[−1, 2, 0, 1]
16. A|B = ________________________.
17. A&B = ________________________.
18. A.*B~0 = ________________________.
19. ~A = ________________________.
20. A>=B = ________________________.
21. mod(B,2)~0 = ________________________.
22. char(B+98) = ________________________.
23. xor(A,B) = ________________________.
Part IV. Short answers. (12 Points)

24. (6 Points – 3 Each) According to the precedence of the operators, use parentheses to isolate them in their operating orders. For example: 2–5^3*4 will be presented as (2–((5^3)*4))

a) 2*4^3+4*7^2*4^–3*2: ________________________________.

b) 4*3^7+5^4*2^6^2: ________________________________.

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

25. Expression (5 < 2 ^ 3 < 4 / 2 || ~3) returns ____________________.

26. In MATLAB, sin(pi) is not equal to sin(π) is due to _____________________ error.

27. If a=[7, −11, 6, 3, −8], then a<0 returns: ________________________________.

Part VI. Multiple Choices. Circle one answer. (10 Points – 2 Each)

28. Which of the following has the highest precedence within an expression?
   a. ~
   b. ==
   c. *
   d. +
   e. None of the above.

29. Which of the following is not a relational operator?
   a. ~=
   b. ~
   c. <
   d. >=
   e. None of the above.

30. Which of the following keyword cannot be used in a branch statement?
   a. switch
   b. try
   c. case
   d. otherwise
   e. if
   f. else if
   g. catch
   h. None of the above.

Part VII. Short answers. Examine the following statements, and determine the outputs when each loop is done. (12 points – 2 each)

31. Given: k=12; n=0; while k; k=k–3; n=n+1; end; then k = _________ and n = __________.

32. Given: n=0; for i=–2:3:7; n=n+1; end; then n = __________ and i = __________.

33. Given: n=0; for i=[1:3, 8:-2:5]; n=n+1; end; then n = ________________.

34. Given: n=0; a=rand(7, 3); for i=a(:); n=n+1; end; then n = ____________.
Part VIII. Short answers. (18 Points)

35. (5 Points) Use matrix operations to create an array of \( N \) elements with \( n \)-th element valued as \( \frac{n^2-7}{n^2+10n-5} \). The integer \( N \) should be got from a keyboard.

36. (6 Points) Given the following script, state the output.
   
   Output 1: (3 points)

   Output 2: (3 points)

   \[
   \begin{align*}
   \text{Output 1:} & \quad (3 \text{ points}) \\
   \text{Output 2:} & \quad (3 \text{ points}) \\
   \end{align*}
   \]

37. For the script \texttt{tst33} defined in the left box, what will the output in the command window be?

   \begin{itemize}
   \item \textbf{Output 1:}
   \begin{verbatim}
   \% tst33
   rt=1;
   for i=1:2:length(a)
     rt=rt*a(i);
   end
   disp(rt)
   \end{verbatim}

   \item \textbf{Output 2:}
   \begin{verbatim}
   >> edit tst33
   >> a=2:6;
   >> tst33
   (Output 1)
   >> a=(a.^2);
   >> tst33
   (Output 2)
   \end{verbatim}
   \end{itemize}

38. (7 Points) Assume that \( x \) is degree in the range of \([0, 2\pi]\), \( y=\sin(x)\cdot\cos(3x) \), and \( z=\cos(x)\cdot\sin(3x) \). How to create a figure like the given picture? Specify the statements that create such a graph.